VH5 series inverter

User manual

Wuxi XINJE Electric Co., Ltd.

Data No. INV C 06 20240409EN 1.3.3

Basic description

- Thank you for purchasing Xinje VH5 series inverter. Please read this product manual carefully before carrying out relevant operation.
- The manual mainly provides users with relevant guidance and instructions for the correct use and maintenance of the inverter. The manual involves the functions of the inverter capability, usage, installation and maintenance, etc.
- The contents in the manual are only applicable to the inverter products of XINJE company.

Notice to users

This manual is applicable to the following personnel:

- The installation personnel of inverter
- Engineering and technical personnel (electrical engineer, electrical operator, etc.)
- The designer

Before the above personnel operate or debug the inverter, please carefully read the chapter of safety precautions in this manual.

Statement of responsibility

- Although the contents of the manual have been carefully checked, errors are inevitable, and we can not guarantee the complete consistency.
- We will check the contents of the manual frequently and make corrections in subsequent versions. We welcome your valuable comments.
- The contents described in the manual are subject to change without prior notice.

Contact us

If you have any questions about the use of this product, please contact the agent that purchased the product, or you can contact XINJE company directly.

- Tel: 400-885-0136
- Fax: 0510-85111290
- Address: No.816, Jianzhu West Road, Binhu District, Wuxi City, Jiangsu Province, China
- Post code: 214072
- Website: www.xinje.com

Catalog

Attention

Safety precautions

(1) Definition of safety information

	Notice	Steps taken to ensure proper operation.
	Danger	If you do not comply with the relevant requirements, it will cause serious personal injury, or even death.
	Warning	Failure to comply with the requirements may result in personal injury or equipment damage.

(2) Safety notice

- Unpacking check

 Notice
1. Before unpacking, please check whether the outer package of the product is in good condition, and whether there is damage, moisture, deformation, etc. 2. Before unpacking, please check whether the external model identification of the packing box is consistent with that of the ordered model. 3. When unpacking, please check the surface of products and accessories for damage, corrosion, bruise, etc. 4. After unpacking, please check whether the product name plate label is consistent with the external model label. 5. After unpacking, check whether the internal accessories are complete, including operation panel and expansion card. Note: If any of the above five points appear during unpacking, please contact the local Xinje office or Xinje dealer in time, and we will solve the problem for you as soon as possible.

- Installation

 Notice
1. When carrying, please hold the bottom of the machine. If you only hold the panel, there is a risk that the main body will fall and hurt your feet. 2. Please install it on the plate of metal and other non combustible materials. If it is installed on flammable materials, there is a risk of fire. 3. When more than two inverters are installed in the same control cabinet, please set the cooling fan and keep the air temperature at the air inlet below 40 ℃. Due to overheating, it can cause fire and other accidents.

- Wiring

Notice
1. Please confirm whether the rated voltage of AC main circuit power supply is consistent with that of inverter. Danger of injury and fire. 2. Do not do voltage withstand test on the inverter. Will cause damage to semiconductor components, etc. 3. Please connect the brake resistor or brake unit according to the wiring diagram. There is a risk of fire. 4. Please use the screw driver with specified torque to fasten the terminal. There is a risk of fire. 5. Do not connect the input power line to the output U, V and W terminals. If the voltage is applied to the output terminal, the inverter will be damaged internally. 6. Do not connect the phase-shifting capacitor and LC / RC noise filter to the output circuit. It will cause internal damage to the inverter. 7. Do not connect the electromagnetic switch and contactor to the output circuit. When the inverter is running with load, the surge current generated by the action of electromagnetic switch and electromagnetic contactor will cause the over-current protection circuit of the inverter to act. 8. Do not remove the front panel cover. May cause internal damage to the inverter.
Danger
1. Before wiring, please make sure that the input power has been cut off. Danger of electric shock and fire. 2. Ask electrical engineering professionals to do wiring operation. Danger of electric shock and fire. 3. The grounding terminal must be reliably grounded. Danger of electric shock and fire. 4. After the emergency stop terminal is connected, be sure to check whether its action is effective. There is a risk of injury. (the responsibility for wiring shall be borne by the user) 5. Do not touch the output terminal directly, do not connect the output terminal of the inverter with the cover, and do not short circuit between the output terminals. There is danger of electric shock and short circuit. 6. After cutting off the AC power supply, before the indicator light of the AC motor driver goes out, it means that there is still high voltage inside the AC motor driver, which is very dangerous. Please do not touch the internal circuit and components.

- Maintenance and inspection

Notice
1. The keyboard, control circuit board and driver circuit board are equipped with CMOS integrated circuits. Please pay special attention when using. If you touch the circuit board directly with your fingers, static induction may damage the integrated chip on the circuit board. 2. Do not change the wiring or remove the terminal wiring during power on. Do not check the signal during operation. It will damage the equipment.

Danger
1. Do not touch the terminal of the inverter, there is high voltage on the terminal. Danger of electric shock. 2. Before power on, be sure to install the terminal cover. When removing the cover, be sure to disconnect the power supply. Danger of electric shock. 3. Non professional technicians are not allowed to carry out maintenance and inspection. Danger of electric shock.

Precautions for use

- Constant torque and low speed operation

When the inverter with ordinary motor runs at low speed for a long time, the motor life will be affected due to the poor heat dissipation effect. If low speed constant torque long-term operation is needed, special frequency conversion motor must be selected.

- Confirmation of motor insulation

When using VH5 series inverter, please confirm the insulation of the motor before connecting the motor, so as to avoid damaging the equipment. In addition, when the motor is in a bad environment, please check the insulation of the motor regularly to ensure the safe operation of the system.

- Negative torque load

For such occasions as lifting the load, there will often be negative torque, and the inverter will trip due to over-current or over-voltage fault. At this time, the selection of braking resistance should be considered.

- Mechanical resonance point of load device

In a certain output frequency range, the inverter may encounter the mechanical resonance point of the load device, which must be avoided by setting the jump frequency.

- Capacitors or varistors to improve power factor

As the output voltage of the inverter is pulse wave type, if the output side is installed with capacitors to improve the power factor or varistors for lightning protection, it will cause the inverter fault trip or device damage. Please remove it. In addition, it is recommended not to add air switch and contactor and other switching devices on the output side.

- The use of derating when setting the fundamental frequency

When the fundamental frequency is lower than the rated frequency, please pay attention to the derating of the motor to avoid overheating and burning.

- Operate at frequency above 50 Hz

If the frequency exceeds 50 Hz, in addition to considering the vibration and noise increase of the motor, it is also necessary to ensure the speed range of the motor bearing and mechanical device, and make sure to check in advance.

- Electronic thermal protection value of motor

When selecting the suitable motor, the inverter can implement thermal protection for the motor. If the rated capacity of motor and inverter does not match, the protection value must be adjusted or other protection measures must be taken to ensure the safe operation of motor.

- Altitude and derating

In the area with altitude more than 1000 meters, the heat dissipation effect of inverter becomes worse due to the thin air, so it is necessary to reduce the rating.

- About the protection level

The protection grade IP20 of VH5 series inverter is achieved when the status display unit or keyboard is selected.

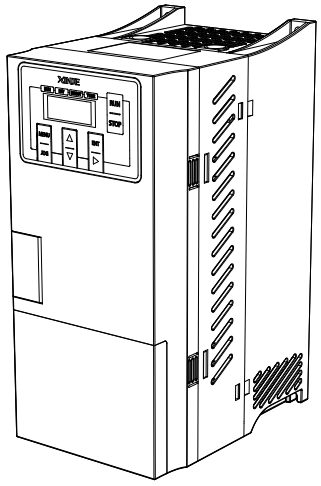
- Notes on scrapping

When scrapping the inverter, please pay attention to:

When the electrolytic capacitors in the main circuit and printed circuit board are burned, they may explode. Toxic gases are produced when plastic parts are burned. Please treat as industrial waste.

1. Product introduction

1-1. Product overview



VH5 series is a simple inverter developed by XINJE company. The product adopts vector control technology, which realizes asynchronous open-loop vector control, and strengthens the reliability and environmental adaptability of the product.

1-1-1. Naming rule

VH 5 - 4 0.7G/1.5P - B

① ② ③ ④ ⑤

①	Product identification	VH: General inverter
②	Product series	5: Communication type open-loop vector inverter
③	Input voltage level	4: AC 380V 2: AC220V
④	Power level	P: Light load G: Heavy load
⑤	Brake unit	B: Built-in brake unit

1-2. Specification

1-2-1. Technical specification

Model VH5-_ _ _ _-B	20P7	21P5	22P2
Adaptive motor (KW)	0.75	1.5	2.2
Input rated current (A)	5.6	9.3	12.7
Power supply capacity (KVA)	1.5	3.0	4.5
Output rated current (A)	4.0	7.0	9.6

Model VH5-_ _ _ _-B		40.7G/1.5P	41.5G/2.2P	42.2G/3.7P	43.7G/5.5P	45.5G/7.5P
Adaptive motor (KW)	G type	0.75	1.5	2.2	3.7	5.5
	P type	1.5	2.2	3.7	5.5	7.5
Input rated current (A)		3.4	5.0	5.8	10.5	14.6
Power supply capacity (KVA)		1.5	3.0	4.0	5.9	8.9
Output rated current (A)	G type	2.1	3.8	5.1	9.0	13.0
	P type	3.8	5.1	9.0	13.0	17.0

1-2-2. General specification

Item		Specification	
Input	Rated voltage, frequency	380V: Three phase 380V, 50Hz/60Hz 220V: Single phase 220V, three phase 220V, 50Hz/60Hz	
	Allowable voltage fluctuation range	380V: 320V~460V 220V: 187V~253V	
Output	Voltage	0~input voltage	
	Frequency	0~600Hz	
Control	Control motor type	Asynchronous motor	
	Control performance	Vector control without speed sensor (SVC)	V/F control (VVF)
	Speed accuracy	±0.5%	±1%
	Speed fluctuation	±0.3%	±0.5%
	Speed range	1: 100	1: 50
	Startup torque	0.5Hz: 150%	1.0Hz: 150%
	Torque accuracy	±10% of rated torque	//
	Torque response	≤20ms	//
	Overload ability	SVC: 150% rated current 53s, 180% rated current 1s VF: 150% rated current: 74s G type: 150% of rated current: 60s P type: 110% of rated current: 60s	
	Frequency accuracy	Low frequency operation mode: 0.01Hz High frequency operation mode: 0.1Hz	
	Frequency resolution	Digital setting: 0.01Hz, Analog setting: max frequency×0.025%	
Control terminal input	Input channel	Up to 4 channels digital input X, 1 channel analog input (0~10V/0~20mA)	
	Output channel	Support 1 channel digital output, 1 channel analog output (0~10V/0~20mA), 1 channel relay output (1 pair of NO, 1 pair of NC)	
Function	Startup command setting	Communication setting (Modbus, CANopen, EtherCAT), operate panel setting, terminal setting	
	Frequency setting mode	Communication setting (Modbus, CANopen, EtherCAT), operate panel setting, terminal setting, analog AI setting, multi-speed setting, simple PLC setting, PID setting, main and auxiliary setting	
	Typical function	Frequency main and auxiliary operation, reverse inhibition, torque boost, nine kinds of V/F curve settings, five segments of AI curve settings, acceleration and deceleration curve settings, terminal delay and filtering, terminal multi-function input and output, DC braking, energy consumption	

Item		Specification
		braking, inching operation, 16 segments of speed, built-in two channels of PID, speed tracking restart, carrier modulation, fault recording, fault self reset, pre-excitation start, 30 groups of user defined parameters
	Important function	Carrier modulation, torque control, motor auto-tuning, current limiting control, over-voltage control, under voltage control, speed tracking, droop control, vibration suppression, over-voltage and over-current stall control, automatic voltage regulation (AVR), automatic energy-saving operation, etc
	Protection function	Power on motor short-circuit detection, input and output phase loss protection, over-current protection, over-voltage protection, under voltage protection, overheat protection, overload protection, under load protection, over-current and voltage stall protection, relay closing protection, terminal protection, instantaneous power failure non stop, etc
	Energy consumption braking	Built-in braking unit as standard, can connect external brake resistor
	Common DC bus	When the inverter decelerates, it shares the regenerative energy, improves the braking ability, achieves the purpose of energy saving and saves the additional space and cost required by the resistance
Special functions	Multi-bus	Main unit Modbus, extensible EtherCAT and CANopen
	LCD panel	LCD display, parameter setting, status monitoring, parameter copy, fault analysis and location, program download, mass storage of parameters
	Non stop when instantaneous power failure	In case of instantaneous power failure, the load feedback energy compensates for the decrease of voltage and keeps the inverter running for a short time
	Timing control	Timing control function: the time range is 0.1 min~6500.0 min
	Multi-motor switching	Two sets of motor parameters can realize the switching control of two motors.
	Flexible and diversified terminal functions	Multi function terminal X has 51 types, Y has 42 types, AO has 19 kinds of logic function selection, meet the general inverter control function requirements
	Communication customization parameters	It is convenient for users to read and write the inverter parameters continuously
	Software	Rich background monitoring function, convenient for field data collection and debugging
Display and keyboard	Keyboard display	It can display the set frequency, output frequency, output voltage, output current, input and output status and other parameters
	Button locking	Realize the partial or total locking of keys to prevent false triggering
	Parameter copy	Standard LED single display numeric keyboard, optional LCD English display keyboard (parameter download)
	Optional accessories	LCD keyboard
Environment	Using place	Indoor, free from direct sunlight, dust, corrosive gas, combustible gas, oil mist, water vapor, dripping or salt, etc
	Altitude	Below 1000 meters. (Derating is required when the height is higher than 1000m, and the output current will be reduced by about 10% of the rated

Item		Specification
		current when the height is increased every 1000m.)
	Ambient temperature	-10℃~+40℃ (When the ambient temperature is between 40℃ and 50℃, please reduce the rating or enhance the heat dissipation)
	Ambient humidity	Less than 95%RH, no condensation
	Vibration	Less than 5.9 m/s² (0.6G)
	Storage temperature	-40℃~+70℃
	Protection level	IP20
	Cooling mode	Forced air cooling
Installation mode		Wall mounted and embedded

2. Installation and wiring

2-1. Installation environment

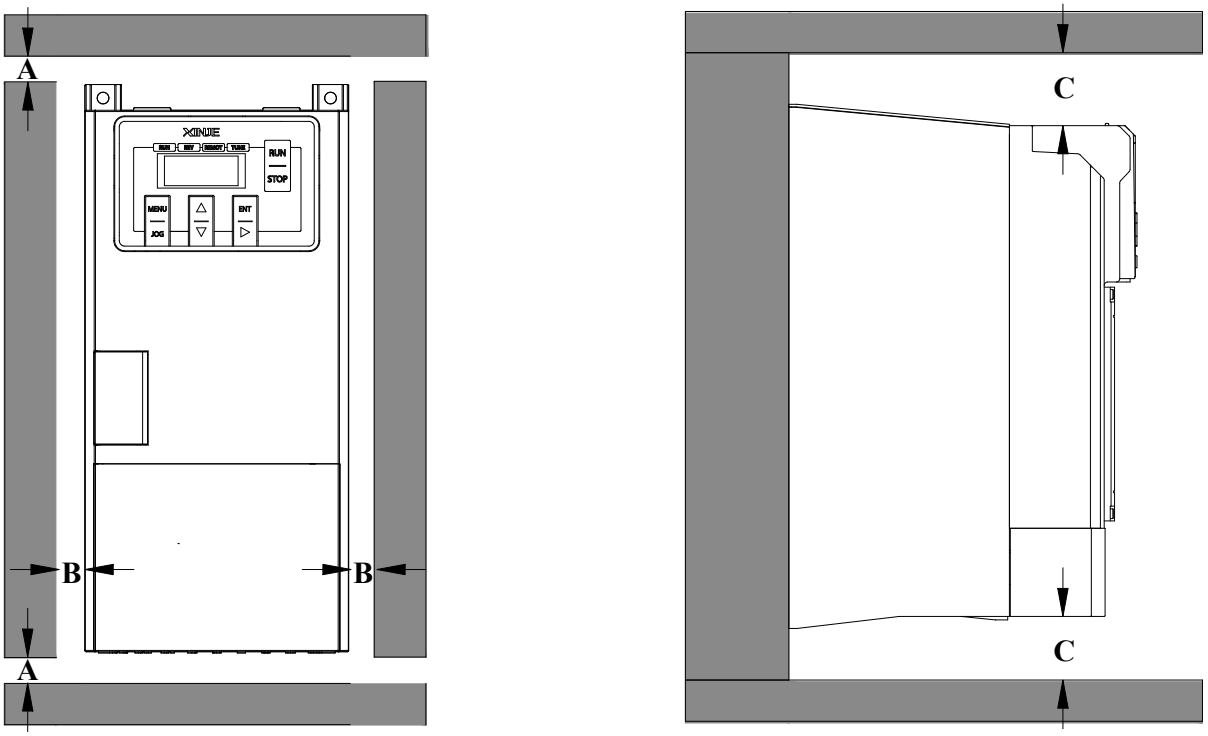
2-1-1. Environment requirements

- It should be installed in a well ventilated indoor place, and the ambient temperature should be within the range of -10°C ~ 40°C. If the temperature exceeds 40°C, it needs external forced cooling or derating.
- Avoid installation in places with direct sunlight, dusty, floating fiber and metal powder.
- It is strictly forbidden to install in places with corrosive and explosive gas.
- The humidity should be lower than 95% RH without condensation.
- It is installed in the place where the fixed vibration is less than 5.9m/s² (0.6G).
- Be far away from EMI sources and other electronic equipment sensitive to EMI.

2-1-2. Installation space and direction

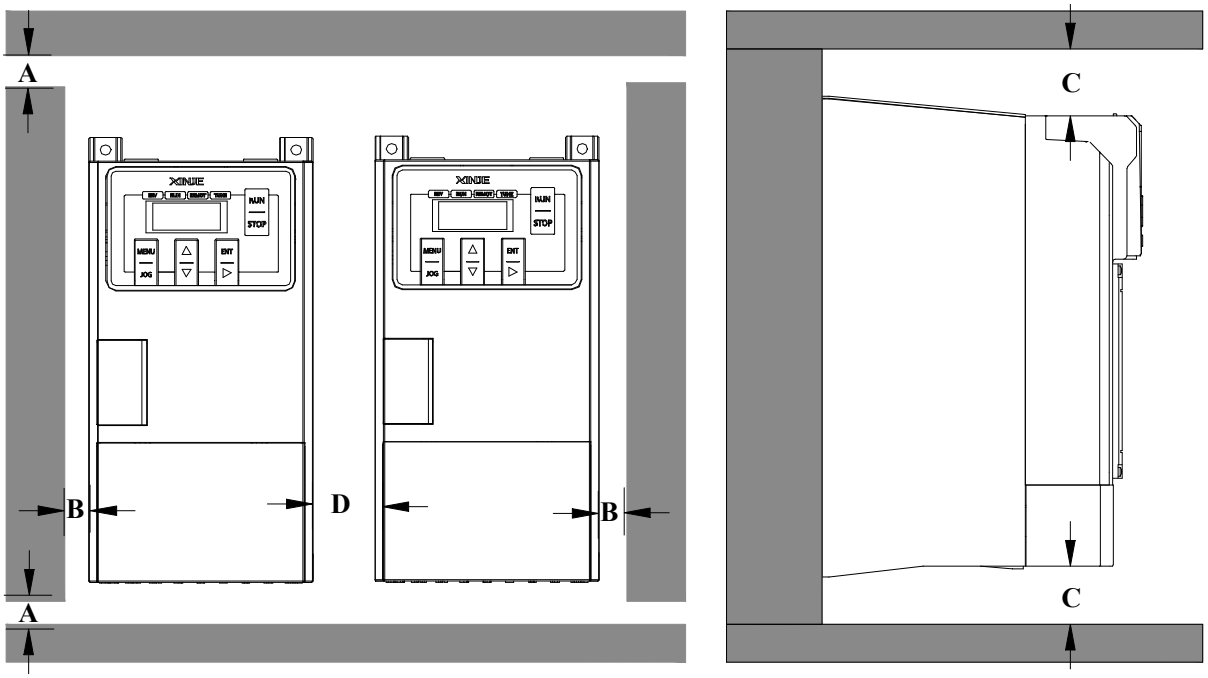
- Generally, it should be installed vertically.
- Minimum requirements for installation spacing and distance.
- When multiple inverters are installed up and down, the middle part shall be equipped with guide plate.

2-1-3. Single installation



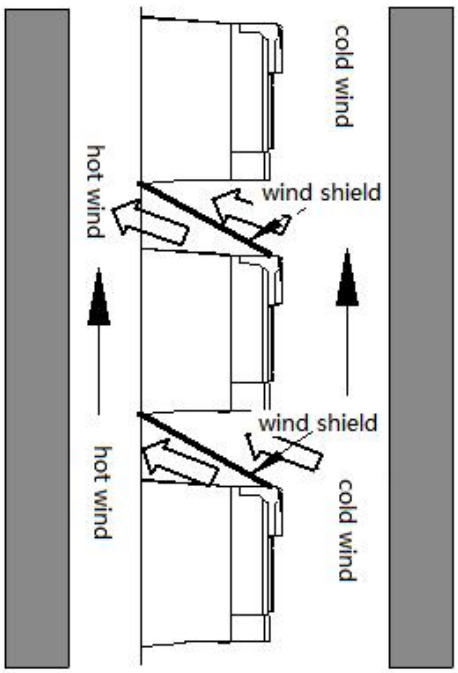
Note: the distance of A and B is more than 50 mm, and the distance of C is more than 100 mm.

2-1-4. Multiple installation



Note: the distance of A and B is more than 50mm, and the distance of C and D is more than 100mm.

2-1-5. Vertical installation

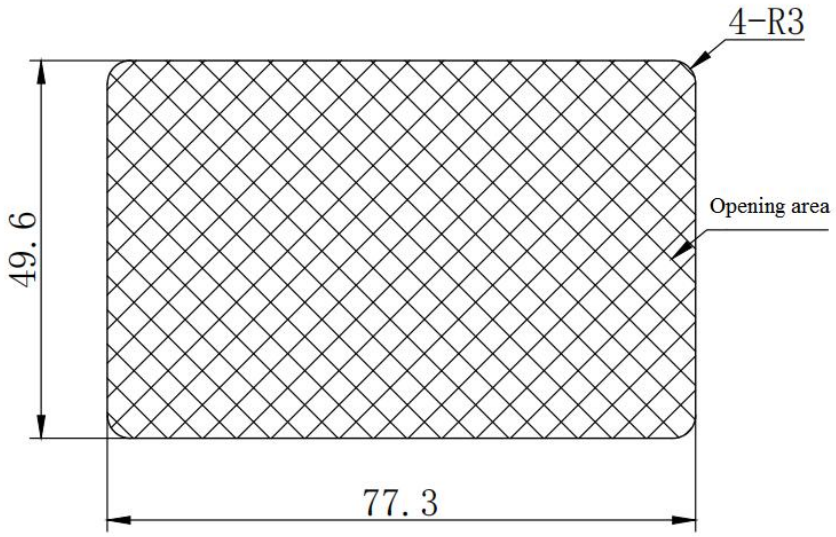


Note: when installing vertically, the wind shield must be added, otherwise it will cause mutual influence between multiple inverters, resulting in poor heat dissipation.

2-1-6. Extend the operate panel

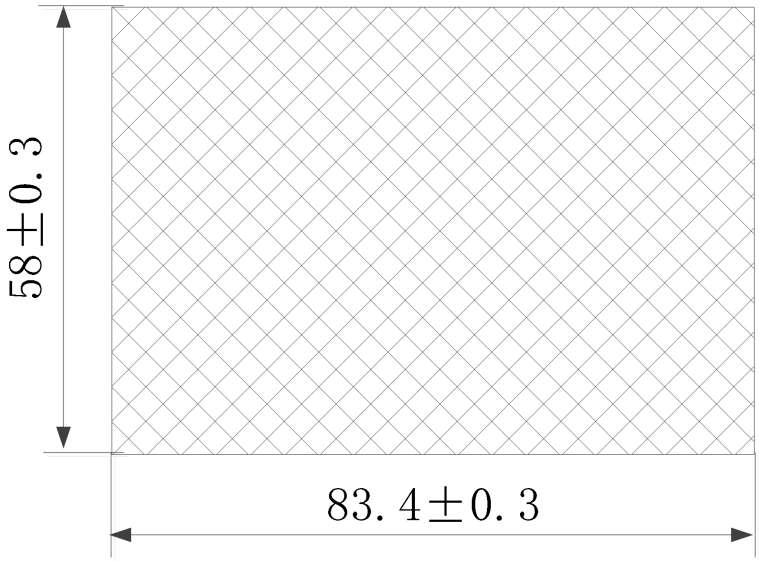
Panel mounting base and related accessories model: VH5-DPANEL
Panel extension cable models: JC-RD-20 (2 meters), JC-RD-30 (3 meters), only available in lengths of 2 meters or 3 meters. If other lengths of extension cables are needed, regular network cables can be used instead.

1) Without the use of a panel mounting base, the size is as follows:



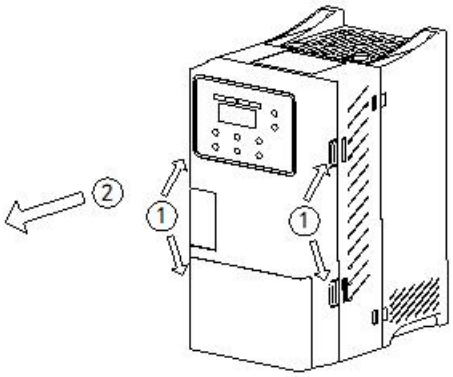
Installation instructions: according to the dimensions in the figure above, open the hole on the outer surface of the operation panel to be installed. Then, according to the schematic diagram below, remove the control panel, install it in the opening area, and push it in place.

2) With the use of a panel mounting base, the size is as follows:

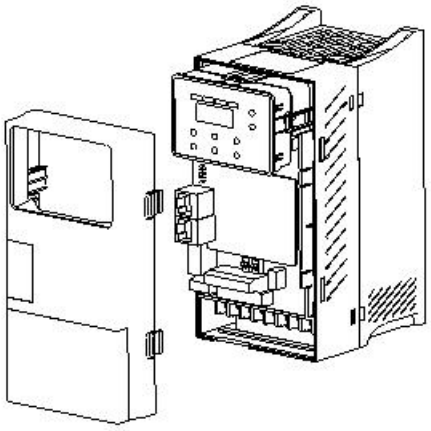


Installation instructions: according to the dimensions in the figure above, open the hole on the outer surface of the operation panel to be installed. Then, according to the schematic diagram below, remove the control panel, install it in the opening area, and push it in place.

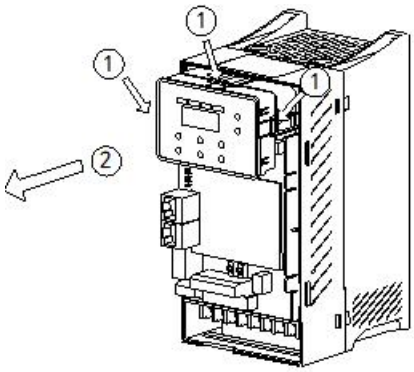
3) The disassembly diagram of the operation panel is as follows:



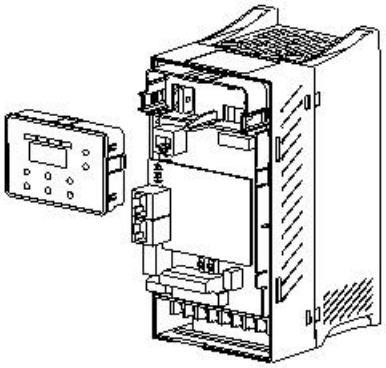
Press the snap-fit to take out



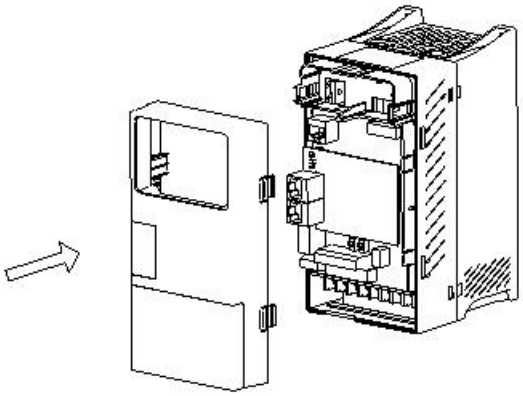
the front cover is taken out



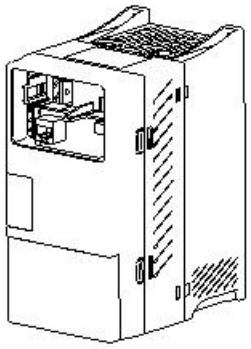
Press the snap-fit to take out



the operate panel is taken out



Align the cover and push them in the direction of the arrow



finish the front cover installation

2-2. Wiring notice

Notice

- Ensure that the power supply has been completely cut off for more than 15 minutes before wiring, otherwise there is a risk of electric shock.
- It is strictly forbidden to connect the power cable with the output terminal U, V and W of the inverter.
- There is leakage current in the inverter itself. In order to ensure safety, the inverter and motor must be grounded safely. Generally, the diameter of grounding wire is more than 3.5mm² copper wire, and the grounding resistance is less than 10Ω.

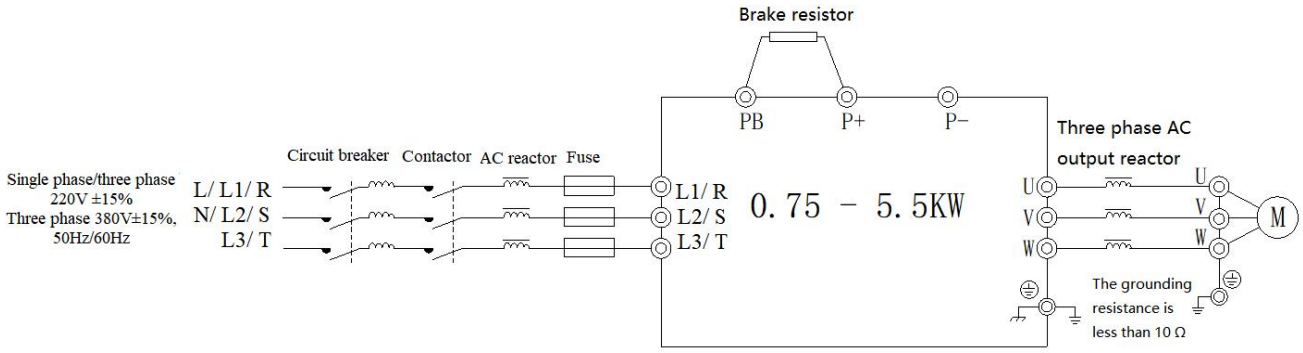
- The inverter has passed the withstand voltage test before leaving the factory, and the user cannot carry out the withstand voltage test on the inverter.
- The electromagnetic contactor, absorption capacitor or other resistance capacitance absorption device shall not be installed between the inverter and the motor.
- In order to provide the convenience of input side over-current protection and power failure maintenance, the inverter shall be connected with the power supply through the circuit breaker.
- The input and output circuits of control terminals shall be connected with twisted wires or shielded wires of more than 0.75mm². One end of the shielding layer shall be suspended, and the other end shall be connected with the grounding terminal PE of inverter, and the wiring length shall be less than 50m.

Danger

- Ensure that the power supply of the inverter has been completely cut off, all LED indicators of the operation keyboard are off, and wait for more than 15 minutes before wiring operation.
- The internal wiring can be started only after the DC voltage between P+ and P- of the internal electrolytic capacitor of the inverter is reduced to less than DC36V.
- The wiring operation can only be carried out by trained and authorized qualified professionals.
- Before power on, pay attention to check whether the voltage level of the inverter is consistent with the supply voltage, otherwise it may cause casualties and equipment damage.

2-3. Main circuit wiring

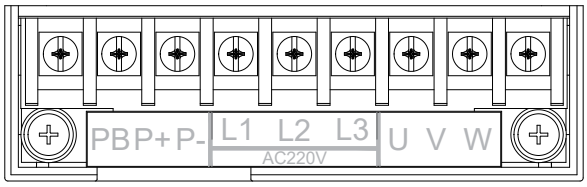
2-3-1. Wiring diagram



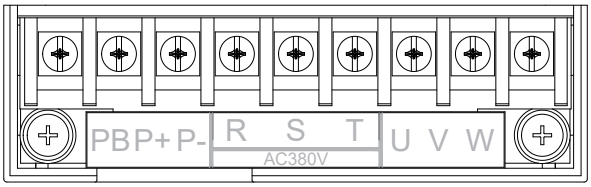
Note: circuit breaker, contactor, AC reactor, fuse, brake resistor and output reactor are optional parts. Please refer to chapter 6 for details.

2-3-2. Arrangement and description of main circuit terminals

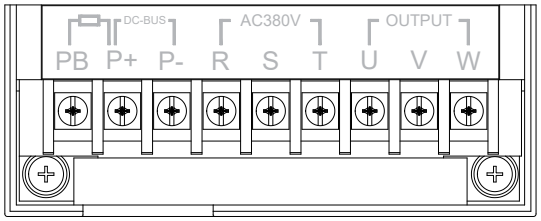
- VH5-20P7-B/VH5-21P5-B/VH5-22P2-B main circuit terminals



- VH5-40.7G/1.5P-B / VH5-41.5G/2.2P-B / VH5-42.2G/3.7P-B / VH5-43.7G/5.5P-B main circuit terminals



- VH5-45.5G/7.5P-B main circuit terminals



- Main circuit terminal description

Terminal	Name	Description
R, S, T	Three phase power supply input	AC three phase power supply input
L1, L2, L3	Single/three phase power supply input	AC single/three phase power supply input
U, V, W	VFD output terminal	Connect to the three phase motor
PE	Grounding terminal	Connect to the ground
P+, PB	Brake resistor terminal	Connect to the brake resistor
P+, P-	DC bus +/-	Common DC bus input

Note:

(1) Input power supply R, S, T/L1, L2, L3

① The input side wiring of the inverter has no phase sequence requirements. When supplying single-phase 220V power to the inverter, connect any two terminals L1, L2, and L3. When the inverter supplies three-phase 220V power, connect L1, L2, L3 or R, S, T; Please refer to 2-3 for terminal positions Main circuit terminal arrangement and description.

② Circuit breaker, contactor, AC reactor, fuse, brake resistor and output reactor are optional parts. Please refer to chapter 6 for details.

(2) P+, P-

① After the power failure, there is residual voltage between P + and P -, all the LED indicator lights of the operation keyboard go out, and wait for more than 15 minutes before wiring operation.

② Don't connect the brake resistor directly to the bus, otherwise the inverter will be damaged or even fire.

(3) P+, PB

① Refer to the recommended value for brake resistance selection, and the wiring distance is less than 5m, otherwise the inverter may be damaged.

(4) Output U, V, W

① Please refer to chapter 6 for output cable.

② No capacitor or surge absorber can be connected to the output side of the inverter, otherwise the inverter will be damaged.

③ When the length of motor cable is more than 100m, it is easy to produce electrical resonance due to the influence of distributed capacitance, so it is necessary to install AC output reactor near the inverter.

(5) Grounding terminal PE

① The terminal must be reliably grounded, and the grounding resistance must be less than 10Ω. Otherwise, the equipment will work abnormally or even be damaged.

② It is not allowed to share the grounding terminal PE and the power zero cable N terminal.

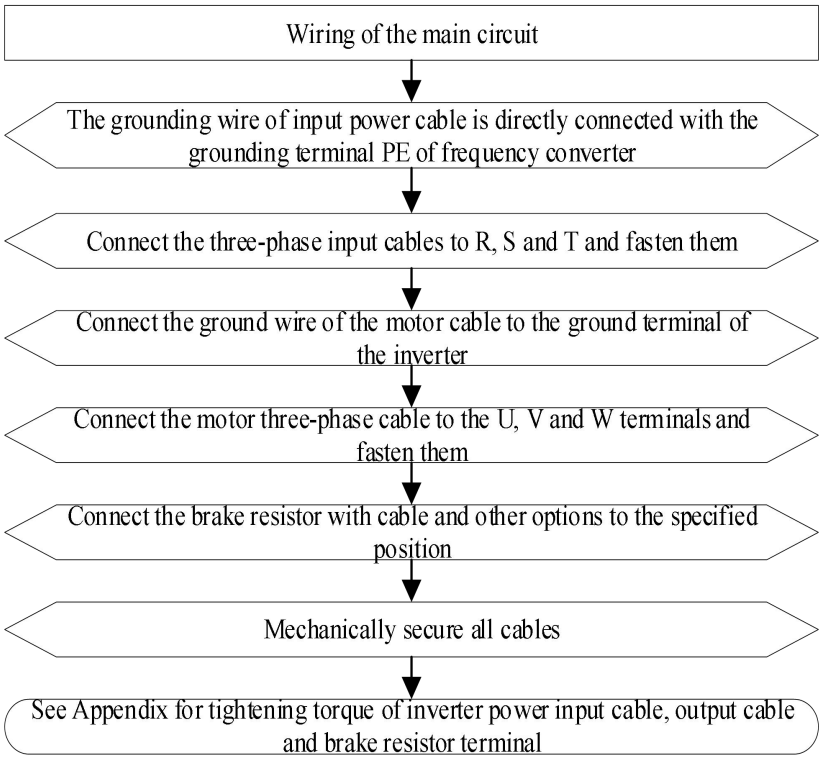
③ The impedance of protective grounding conductor must meet the requirement of withstanding large short-circuit current in case of fault.

④ The size of protective grounding conductor shall be selected according to the table below.

Sectional area of single phase cable (S)	Minimum sectional area of protective conductor (S_p)
$S \leq 16mm^2$	S
$16mm^2 < S \leq 35mm^2$	$16mm^2$
$35mm^2 < S$	S/2

⑤ Yellow and green cable must be used for protective grounding.

2-3-3. Wiring process of main circuit



2-4. Configuration and wiring of the control circuit

2-4-1. Control circuit terminals

(1) VH5 series VFD control terminals

TA TB TC	X1	X3	COM	24V	AI	GND	10V	
	X2	X4	Y1	0V	AO	485-	485+	

(2) Terminal description of control circuit

Type	Terminal	Name	Description
Communication	485+ 485-	RS485 terminal	Standard RS485 communication interface, using twisted pair or shielded wire.
Power supply	10V-GND	+10V power supply	External + 10V power supply, maximum output current: 20mA. Generally used for external potentiometer speed regulation.
	24V-0V	DC 24V power supply	Provide + 24V power supply for terminal, maximum output current: 100 mA It is generally used as working power supply for digital input and output terminals. External load is not allowed to connect.
Common terminal	COM	Common terminal of input X	When using the **internal** power supply to drive the X terminal: COM and 24V are short circuited to form NPN input, COM and 0V are short circuited to form PNP input When using the **external** 24V power supply to drive the X terminal: COM is connected to external power supply 24V+, disconnected from 24V of VH5 to form NPN input, COM is connected to external power supply 0V, disconnected from 0V of VH5 to form PNP input
Analog input	AI-GND	AI	Select voltage/current input by DIP switch Input voltage range: 0~10V (Input impedance: 22kΩ) Input current range: 0~20mA (Input impedance: 500Ω)
Analog output	AO-GND	AO	Select voltage/current output by DIP switch Voltage output range: 0~10V. External load: 2kΩ-1MΩ Current output range: 0~20mA. External load less than 500Ω
Digital input	X1	Input terminal 1	Optocoupler isolation input Input impedance: R = 2KΩ The input voltage range is 9 ~ 30V. Compatible with bipolar input. Note: VH5 doesn't support high speed pulse input
	X2	Input terminal 2	
	X3	Input terminal 3	
	X4	Input terminal 4	
Digital output	Y1	Digital output terminal 1	Collector open circuit output Output voltage range: 0 ~ 24V Output current range: 0 ~ 50mA
Relay output	TA TB TC	Output relay	Programmable is defined as a variety of electrical output terminals TA-TB: normally open TA-TC: normally closed Contactor capacity: AC250V/2A (COSΦ=1) AC250V/1A (COSΦ=0.4) DC24V/1A

Note:

(1) Before the inverter is put into use, the terminal wiring and all jumper switches on the control board should be set correctly.

(2) DIP switch:(The Dip switch is located above the terminal block. On the left is AI switch, and on the

right is AO switch.)

ON1: AI OFF = 0 - 10V, ON = 0 - 20mA, default is OFF

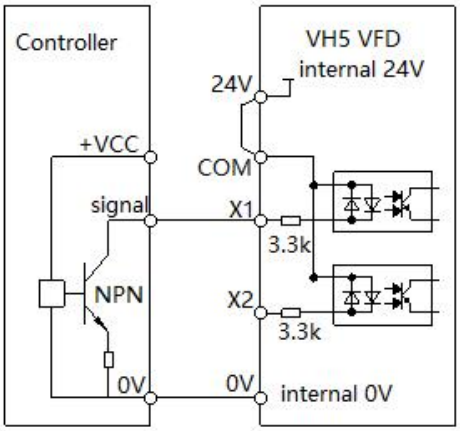
ON2: AO OFF = 0 - 10V, ON = 0 - 20mA, default is OFF

2-4-2. Digital I/O wiring

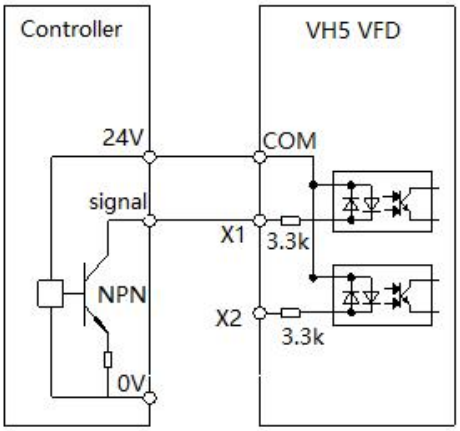
(1) Digital input terminal

Generally, shielded cables are required, and the wiring distance should be as short as possible, not more than 20m. When active driving mode is selected, necessary filtering measures should be taken for the crosstalk of power supply. The contact control mode is recommended, and the specific wiring diagram is as follows:

- Single inverter leakage wiring mode



Single VFD uses internal 24V leakage wiring



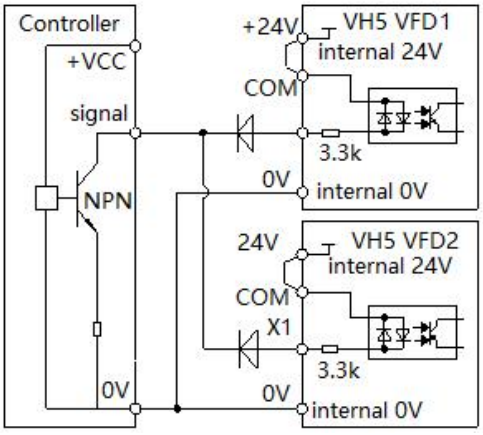
Single VFD uses external 24V leakage wiring

The most common wiring method is to use the **internal** 24V power supply of the inverter.

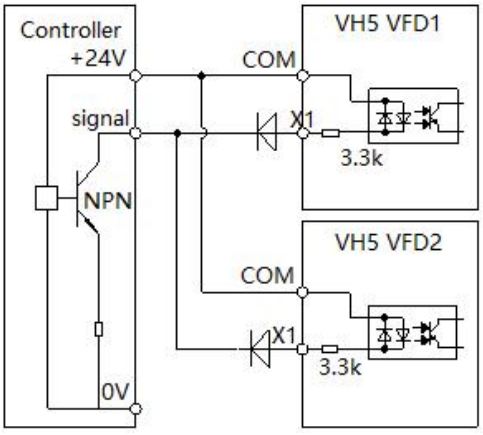
Short circuit the COM and 24V of the inverter, connect the 0V of the inverter with the 0V of the external controller, connect the X terminal with the signal terminal of the external controller, and control the inverter through the ON-OFF of the loop.

If **external** 24V is used, the COM terminal of the inverter shall be connected to the external 24V, and the external power supply 0V shall be connected to the corresponding X terminal through the control contact of the external controller.

- Multi-inverter leakage wiring mode



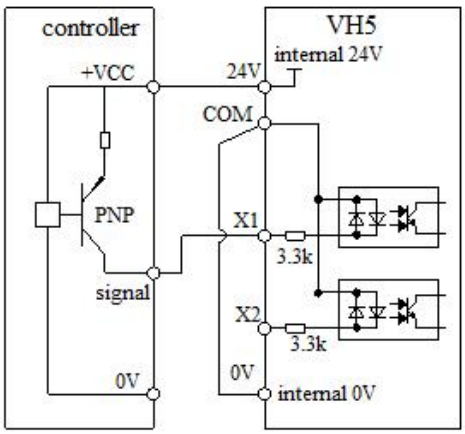
Multi-inverter uses internal 24V leakage wiring

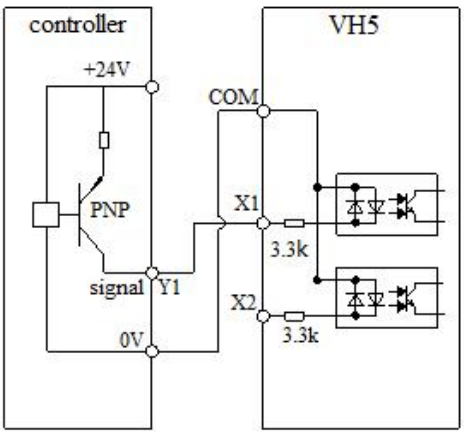


Multi-inverter uses external 24V leakage wiring

Note: Under this connection mode, X terminals of different inverters cannot be connected in parallel, otherwise it may cause X malfunction: if the X terminal needs to be connected in parallel (between different inverters), the diode (anode connected to X) shall be connected in series at the X terminal, and the diode shall meet the following requirements: IF>40mA, VR>40V.

- Single inverter source wiring mode

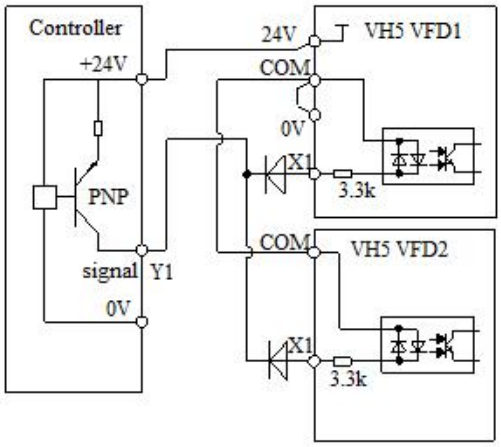


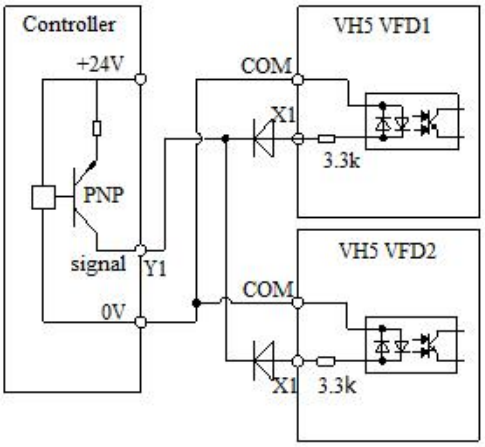


Single VFD uses internal 24V source wiring　　Single VFD uses external 24V source wiring

If the **internal** 24V power supply of the inverter is used, the 0V and COM of the inverter shall be short connected, and the 24V of the inverter shall be connected with the common end of the external controller.
If **external** 24V is used, the COM end of the inverter shall be connected with external 0V, and the external power supply 24V shall be connected to the corresponding X terminal through the control contact of the external controller.

- Multi-inverter source wiring mode





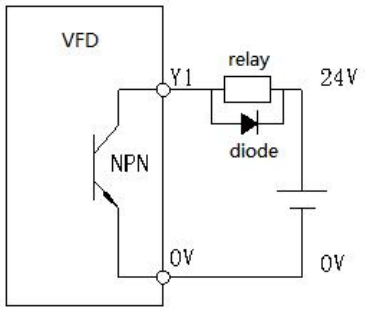
Multi-inverter uses internal 24V source wiring　　Multi-inverter uses external 24V source wiring

Note: Under this connection mode,X terminals of different inverters cannot be connected in parallel, otherwise it may cause X malfunction: if the X terminal needs to be connected in parallel (between different inverters), the diode (anode connected to X) shall be connected in series at the X terminal, and the diode shall meet the following requirements: IF>40mA, VR>40V.

(2) Digital output terminal

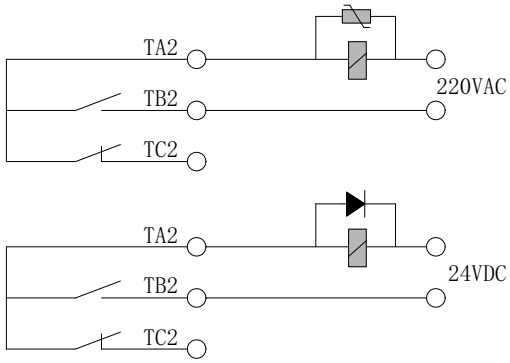
When the digital output terminal needs to drive the relay, freewheeling diodes should be installed on both sides of the relay coil. Otherwise, it is easy to damage the DC24V power supply. The driving capacity is no more than 50mA.

Note: the polarity of freewheeling diode must be correctly installed. As shown in the figure below. Otherwise, when the digital output terminal has output, the DC24V power supply will be burnt out immediately. Selection standard of freewheeling diode: the reverse withstand voltage is greater than 5 ~ 10 times of the load voltage, and the current is greater than the load current.

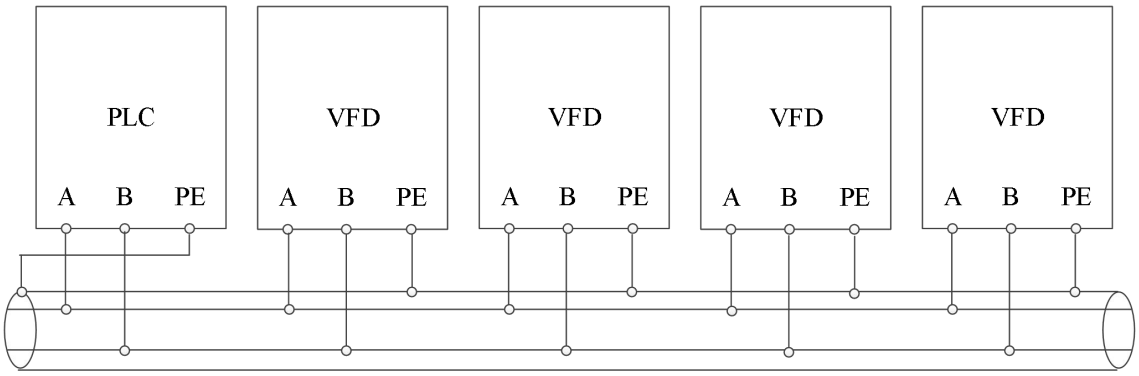


(3) Relay output terminal

Inductive loads (relays, motors, indicator lights) can cause voltage spikes when the current is cut off. The relay contacts are protected by varistors, and the inductive load is equipped with absorption circuits, such as varistors, RC absorption circuits, diodes, etc., to ensure the minimum interference current when turning off.



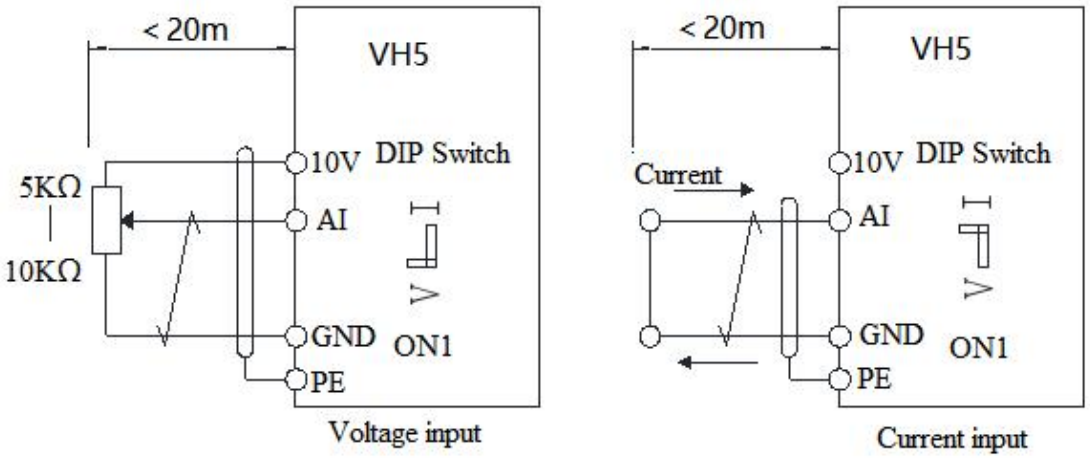
(4) Multiple inverters can be connected together through RS485 and controlled by PLC (or upper computer), as shown in the figure. With the increase of the number of connections, the communication system is more vulnerable to interference. It is suggested that the following wiring methods be adopted:



2-4-3. Analog I/O wiring

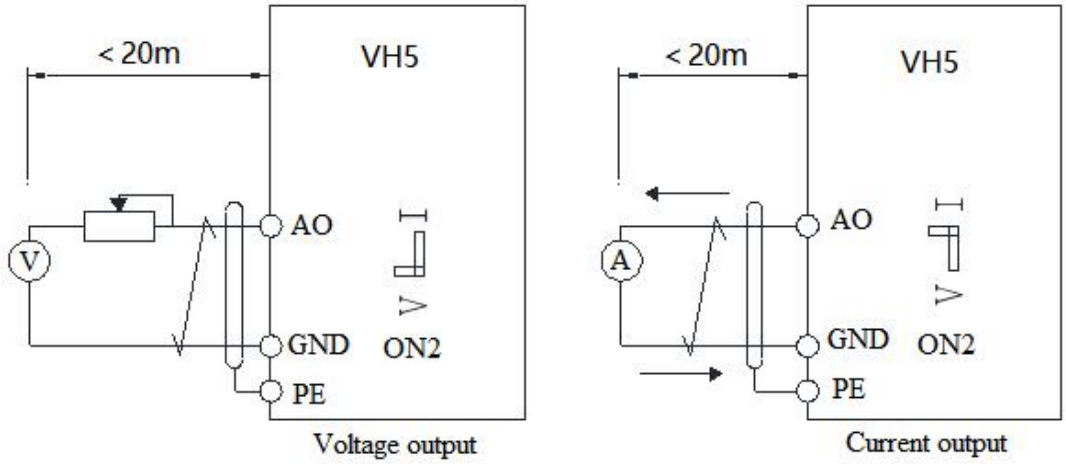
(1) Analog input terminal AI wiring

AI terminal receives analog signal input, and AI dial switch can select input voltage (0 ~ 10V) or current (0 ~ 20mA). The specific wiring is shown in the figure below:



(2) Analog output terminal AO wiring

AO external analog meter can indicate a variety of physical quantities, AO dial switch can select output voltage (0 ~ 10V, external load 2KΩ – 1MΩ) or current (0 ~ 20mA, external load less than 500Ω). The terminal wiring mode is shown in the figure below.



Note:

(1) When using analog input, filter capacitor or common mode inductor should be installed between AI and GND.

(2) The resistance ranges of the potentiometer connected between the control terminal 10V and GND is 5~10K.

(3) Analog input and output signals are vulnerable to external interference. Shielded cables must be used for wiring and well grounded. The length of wiring should be as short as possible and no more than 20m.

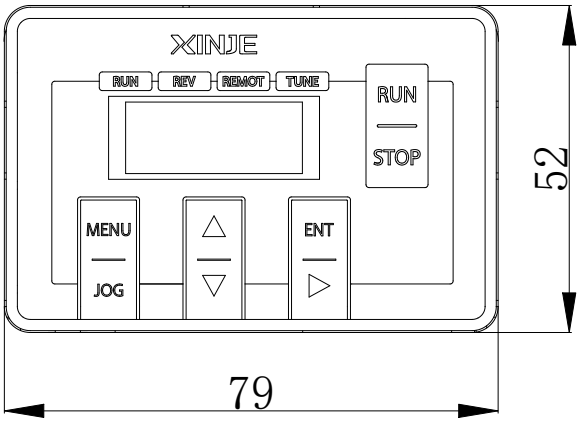
(4) The toggle switch is located above the terminal block, with AI analog current and voltage signal selection toggle on the left and AO analog current and voltage selection toggle on the right.

3. Operation and application

3-1. Operation panel

3-1-1. Appearance

The operation panel and control terminal of the inverter can control the starting, speed regulating, stopping, braking, operation parameter setting and peripheral equipment of the motor. The appearance of the operation panel is shown in the figure below.



3-1-2. Keyboard

There are 8 keys on the inverter operation panel, and the functions are defined as follows:

Button	Name	Function
MENU	Programming/ exit	Enter or exit the programming status
ENT	Save/switch	Save the parameter or enter next menu in programming status
RUN	Forward run	Press this button to run forward in operation panel running command mode
STOP	Stop/reset	Stop/reset the fault
JOG	Multi-function	Set through P8-00
▲	Increase	Increase the value or pause frequency in operation
▼	Decrease	Decrease the value or pause frequency in operation
▶	Shift/monitor	In the editing state, you can choose to set the modification bit of the data, in other states, you can switch the display state and monitor parameters

3-1-3. LED lights

There are 5-digit 7-segment LED digital tubes and 4 status indicators on the inverter operation panel.
The four status indicators are located above the LED tube, from left to right: RUN, REV, REMOT, TUNE. The following table describes the indicator lights.

Indicator lights	Meaning	Function
RUN	Operation indicator	ON: Running OFF: Stop
REV	Forward/reverse operation indicator	ON: Reverse operation OFF: Forward operation Flashing: Status switching
REMOT	Command source indicator	OFF: Panel start/stop ON: Terminal start/stop Flashing: Communication start/stop
TUNE	Tuning indicator	Flash slowly: Tuning status Flash quickly: Fault status ON: Torque status

3-1-4. Operation method

Through the operation panel, the inverter can be operated in various ways, for example:

(1) Parameter display and switch

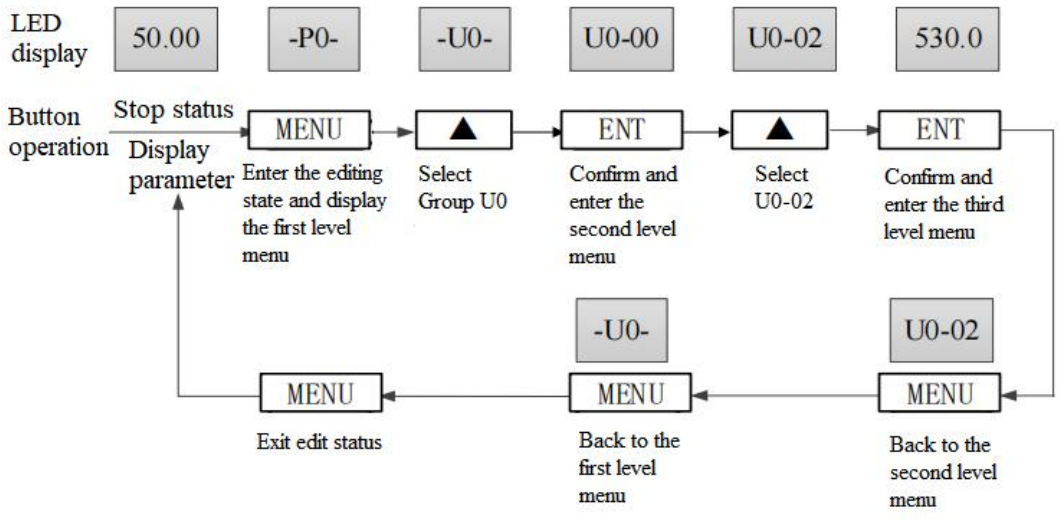
Method 1:

Press ▶ button, switch LED display parameter, set running display parameter P8-07 and P8-08, set stop display parameter P8-09.

When checking status monitoring parameters, you can press ENT key to switch back to the default display status of monitoring parameters. The default monitoring parameter of shutdown state is the setting frequency, and the default monitoring parameter of operation state is output frequency.

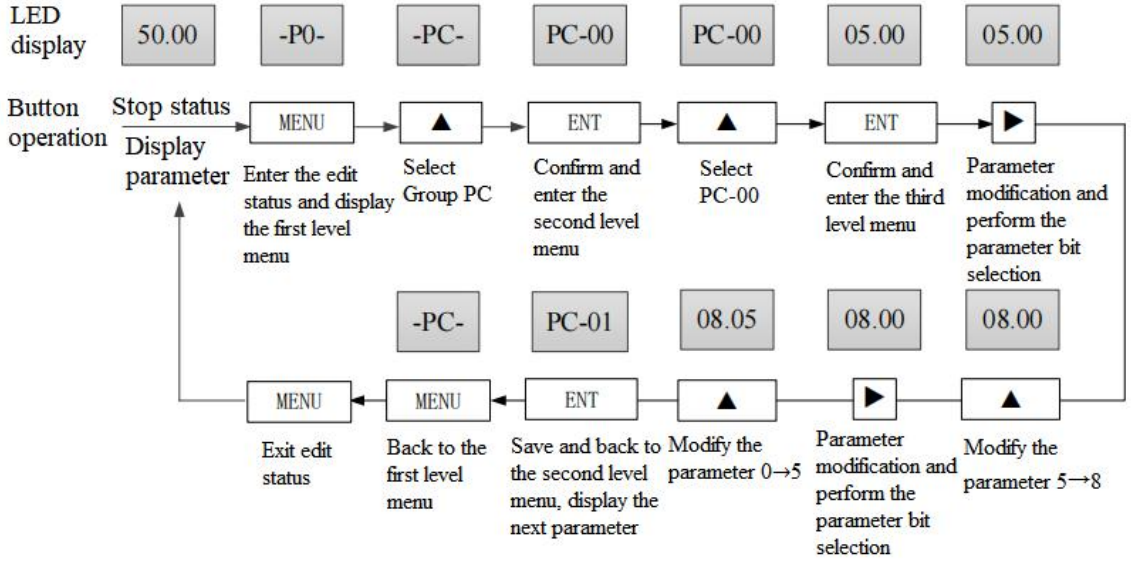
Method 2:

Check group U0 parameters, for example, U0-02.



(2) Set the parameter

- For example, the parameter PC-00 (jog frequency) is changed from 5.00Hz to 8.05Hz.



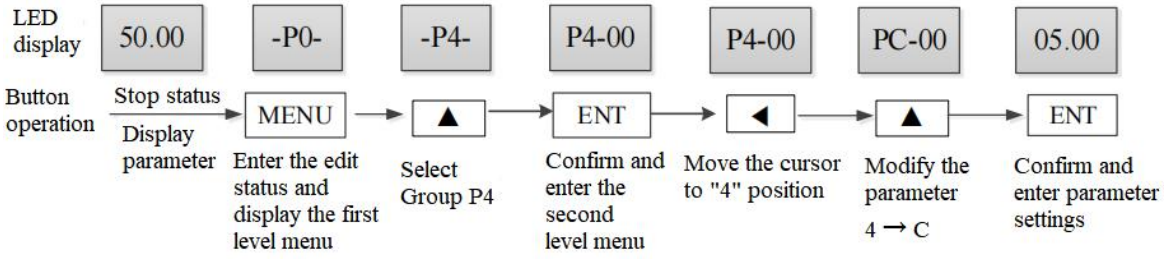
In the three-level menu, if the parameter has no flashing bit, it means that the parameter cannot be modified. The possible reasons are as follows:

①The parameters are not modifiable, such as the actual detection state parameters, operation record parameters, etc.

②This parameter can not be modified in the running state, and can be modified only after shutdown.

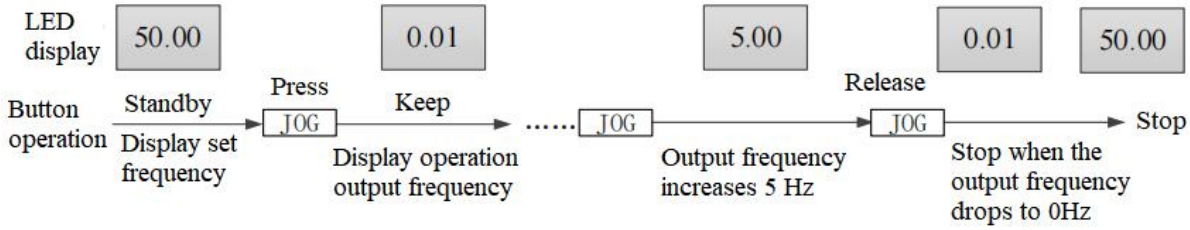
- The function of modifying function code group numbers in the first level menu can be achieved under the second level menu.

For example, in the P4-00 interface, to adjust the value of PC-00, you can press the left button to move the cursor to the position of "4" for adjustment. The specific operation is shown in the following figure:



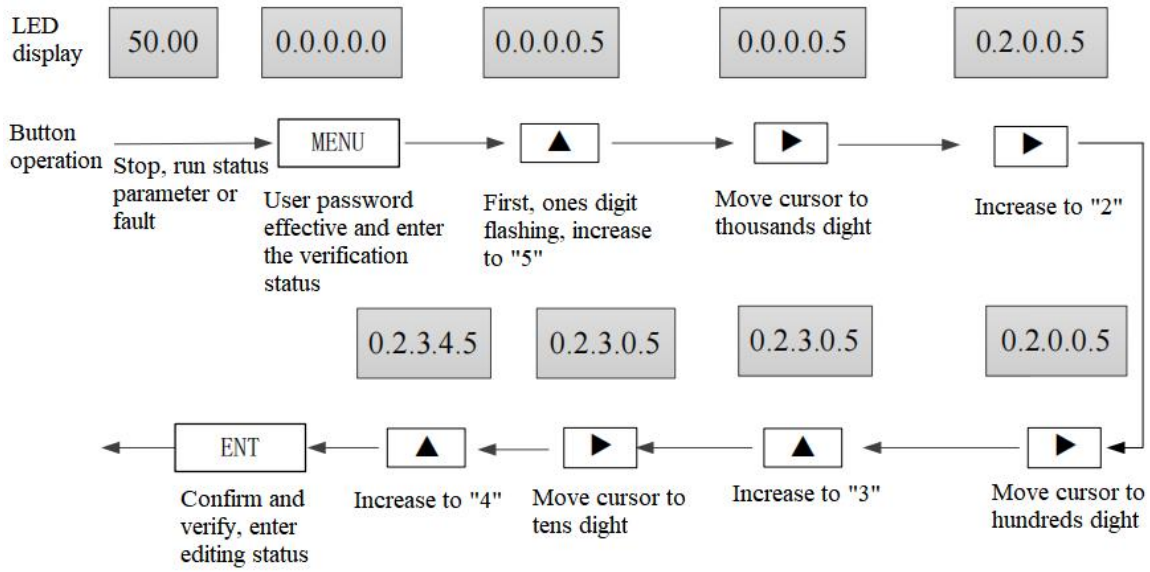
(3) Jog operation

Suppose that the current operation command channel is the operation panel, in the shutdown state, press the JOG function key to select jog forward (P8-00 = 2), and the jog frequency is 5Hz.



(4) Set user password

Suppose that user password P8-03 has been set to 02345. The numbers in bold in the figure below indicate the flash position.



(5) Check fault status and parameters

The method of fault status query is the same as group U0 monitoring parameters.

Note:

- User pressed [▶] in fault status to check group P7 parameters.
- When the user checks the fault parameters, user can directly switch back to the fault code display status by pressing the [MENU] button.

(6) Set frequency through [▲], [▼] buttons

Assuming the VFD is in shutdown parameter display status, P0-03 = 0, the operation mode is as follows:

- Frequency setting through digital setting
- Keep press [▲] to increase ones bit, tens bit, hundreds bit….If release [▲], and press [▼]. It will increase from ones bit again.
- Keep press [▼] to decrease ones bit, tens bit, hundreds bit…If release [▼], and press [▲]. It will decrease from ones bit again.

3-1-5. Multi-function buttons

The function of JOG button can be defined by P8-00, which is used to switch the menu, the rotation direction of inverter or jog. Please refer to the explanation of P8-00 function code for specific setting method.

3-1-6. Quick reference of parameters

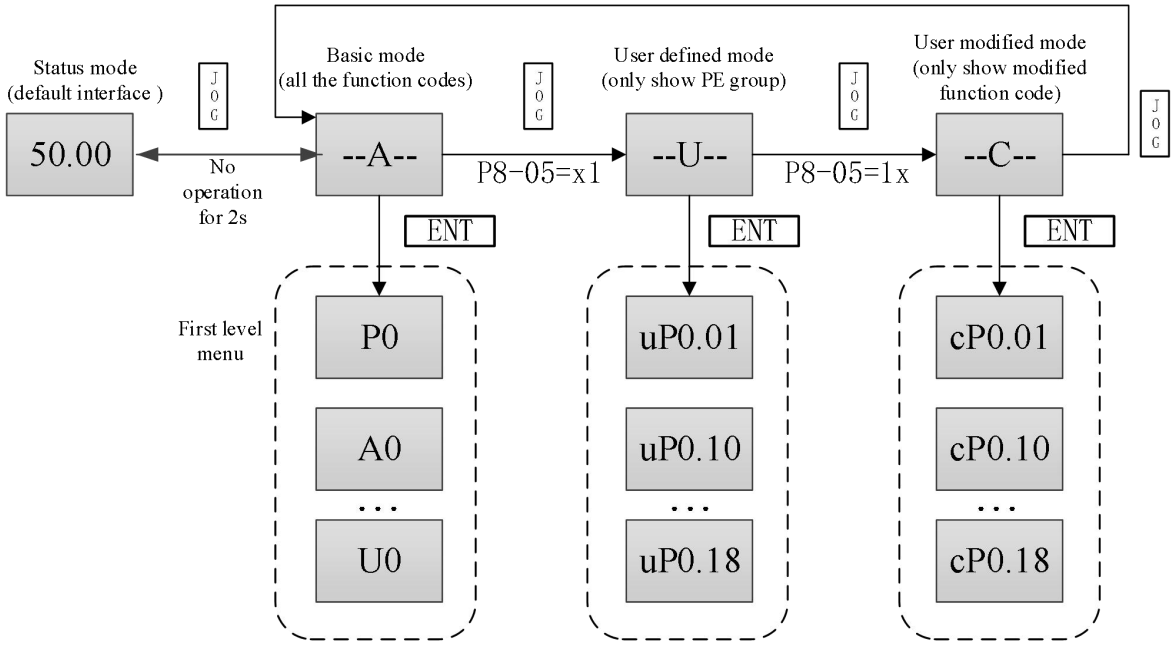
There are many function codes in VH5 series. In order to facilitate users to quickly find the function codes, the inverter provides two methods to quickly find the function codes

(1) Users can select and customize the commonly used function codes, up to 32 of which can be customized to form a user-defined function code group. Users can determine the function parameters to be displayed through PE group.

(2) The function codes which are different from the factory values are arranged automatically by the inverter for users to select quickly. Three ways to check the function codes:

Parameter display mode	Display
Function parameters	--A--
User defined parameters	--U--
User modified parameters	--C--

The three kinds of display mode are switched through the multi-function keys on the panel. After entering the function codes of each group, the search or modification method is the same as the previous keyboard operation.



P8-05 is used to control the display of user defined group and user modified group parameters.

P8-05	Default value: 00		
	Set value	Tens bit	Ones bit
	Function	Group --C-- display	Group --U-- display
	Range	0: No display 1: Display	0: No display 1: Display

Basic function codes

The basic function code group is the whole function code of the inverter. After entering, it is the level I menu. Please check them according to the operation mode described above.

User defined function codes

The user defined menu is easy to check the general parameters. The display form of parameters in the user-defined menu is like "uP0.01", which represents the function parameter P0.01. The effect of modifying parameters in the user-defined menu is the same as that in the normal programming state.

The function parameters of user-defined menu come from group PE. If the function parameters are selected by group PE, and set to P0.00 means that they are not selected, and a total of 32 can be set. If "null" is displayed when entering the menu, it means that the user-defined menu is empty.

Users can customize and edit according to their specific needs.

User modified function codes

In the group of function codes that have been changed by the user, only the current set value is listed. This is a list generated automatically by the inverter, which makes it easy for users to quickly access the modified function code.

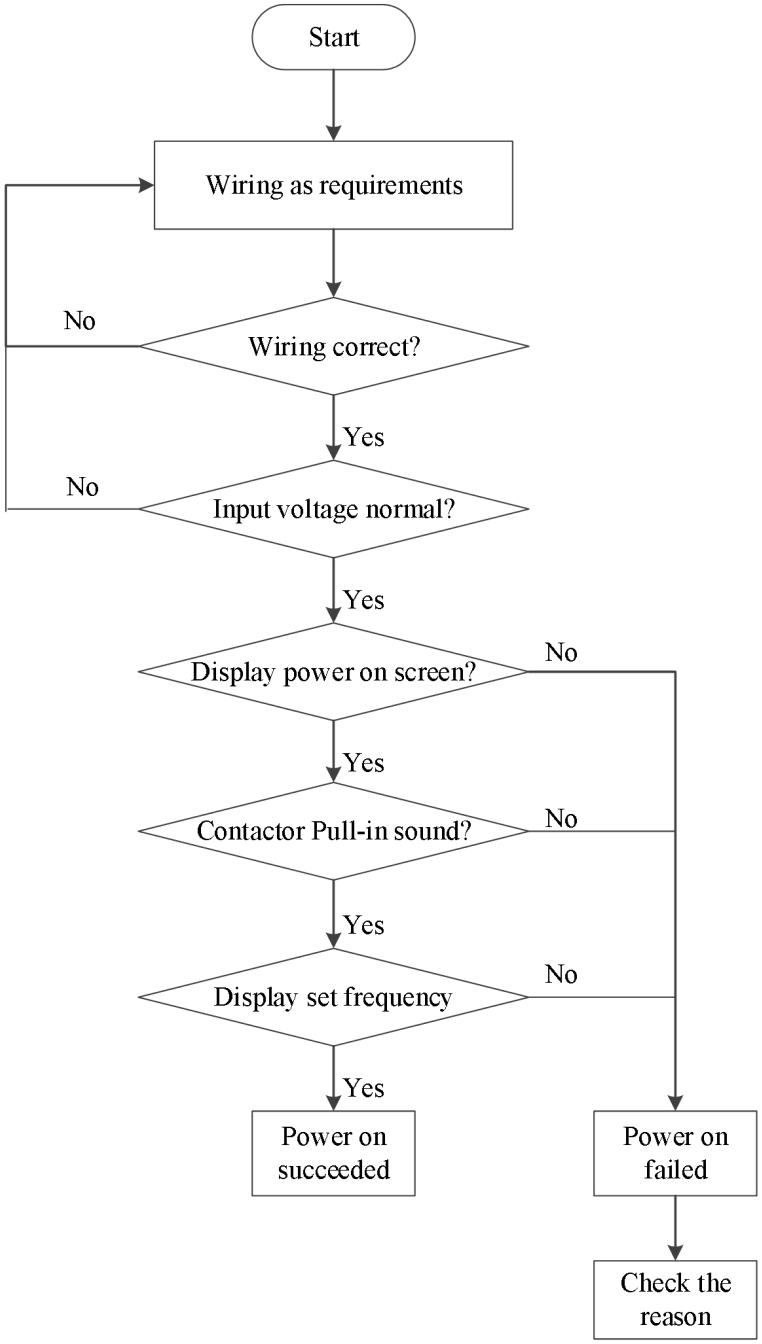
3-2. Power on

3-2-1. Inspection after power on

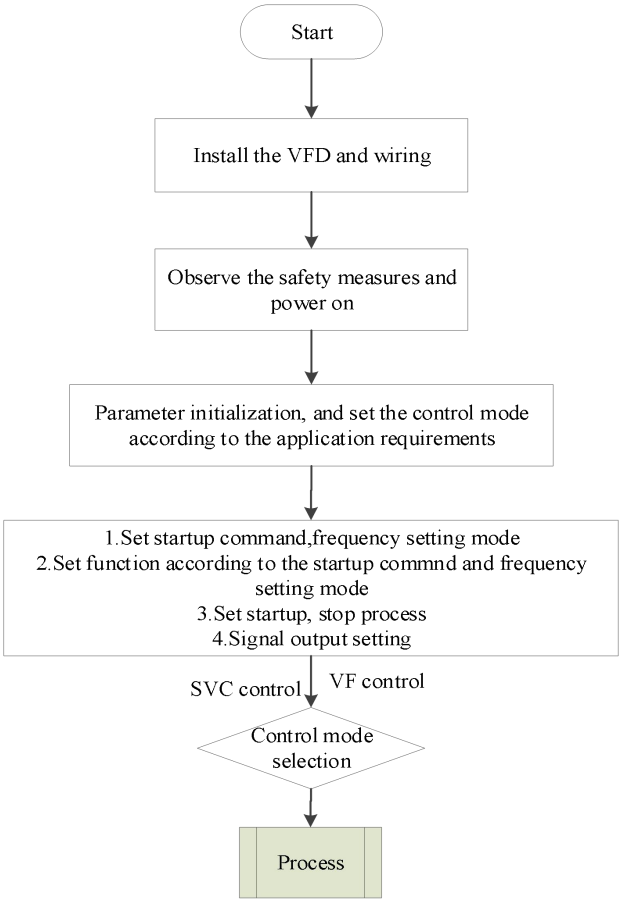
Please wiring according to the operation requirements provided in "EMC" of this manual.

3-2-2. Initial power on operation

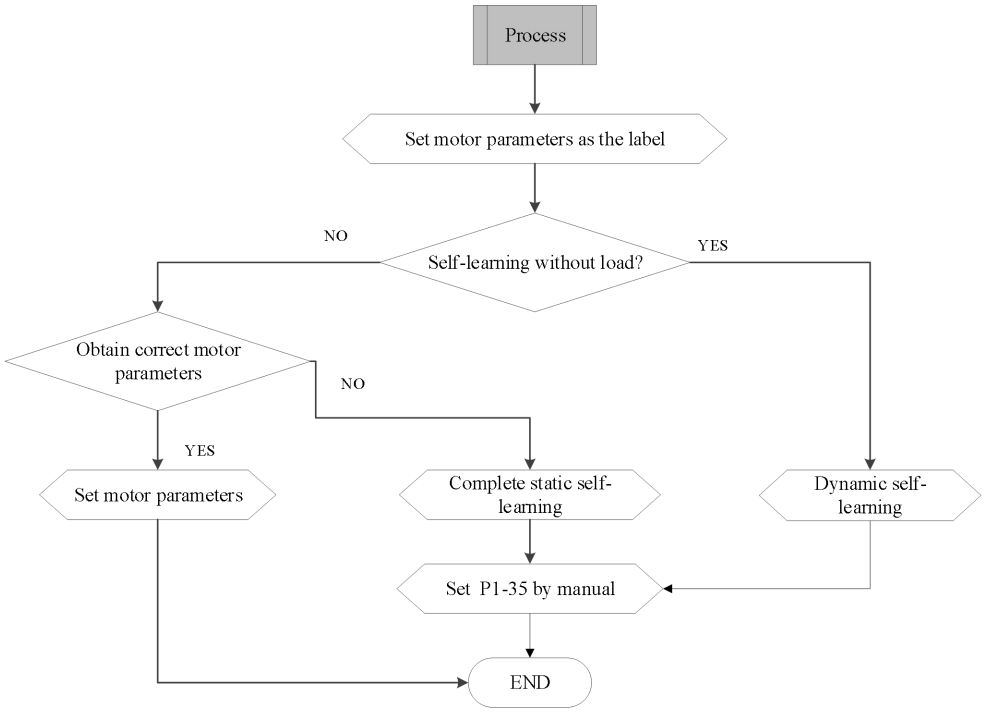
After checking the wiring and power supply, close the AC power switch on the input side of the inverter and power on the inverter. The LED on the operation panel of the inverter displays the dynamic picture of starting up, and the contactor pulls in normally. When the display character changes to the set frequency, it indicates that the inverter has been initialized. The initial power on operation process is shown in the figure below:



3-2-3. Start to debug



3-2-4. Debugging process



3-3. Start stop of the VFD

3-3-1. Start stop signal

There are three kinds of start stop signal sources of inverter, which are panel start stop, terminal start stop and communication start stop. They are selected by function parameter P0-02.

3-3-1-1. Panel start stop

The key on the panel is used for command control, and the run key on the keyboard is pressed to start the operation of the inverter, while the inverter is running, the stop key on the keyboard is pressed to stop the operation of the inverter.

Parameter	Name	Setting value	Note
P0-02	Operation command channel	0	Operation panel command

3-3-1-2. Terminal start stop

VH5 inverter provides a variety of terminal control modes. The switch signal mode is determined by function code P2-10, and the input port of start stop control signal is determined by function code P2-00 ~ P2-09.

Example 1: Two-wire control, forward signal connected to X1, reverse signal connected to X2.

Parameter	Name	Setting value	Note
P0-02	Operation command channel	1	Terminal command
P2-10	XI terminal command mode	0	Two-wire mode 1
P2-00	X1 function selection	1	Forward run
P2-01	X2 function selection	2	Reverse run

Example 2: 3-wire control, forward signal connected to X1, reverse signal connected to X2, stop signal connected to X3.

Parameter	Name	Setting value	Note
P0-02	Operation command channel	1	Terminal command
P2-10	XI terminal command mode	2	Three-wire mode 1
P2-00	X1 function selection	1	Forward run
P2-01	X2 function selection	2	Reverse run
P2-02	X3 function selection	3	Three-wire mode run

3-3-1-3. Communication start stop

VH5 supports Modbus-RTU mode to communicate with the host computer. The built-in communication port of inverter is Modbus-RTU slave protocol, and the host computer must use Modbus-RTU master protocol to communicate with it.

Example of communication parameter setting:

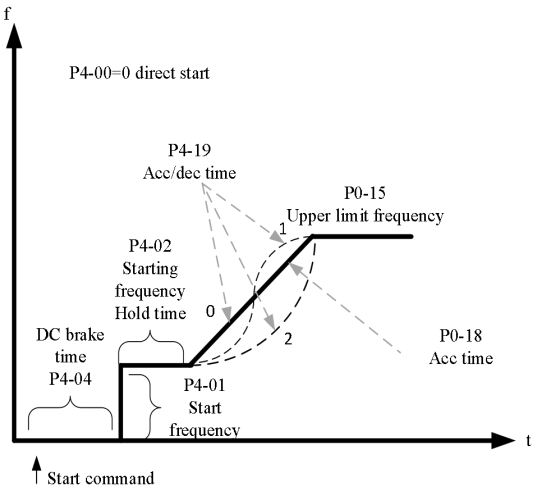
Parameter	Name	Setting value	Note
P0-02	Operation command channel	2	Communication command
P9-00	Communication protocol selection	0	Modbus-RTU
P9-01	Local address	1	Station number 1
P9-02	Baud rate	6	19200BPS
P9-03	Data format	1	8-E-1

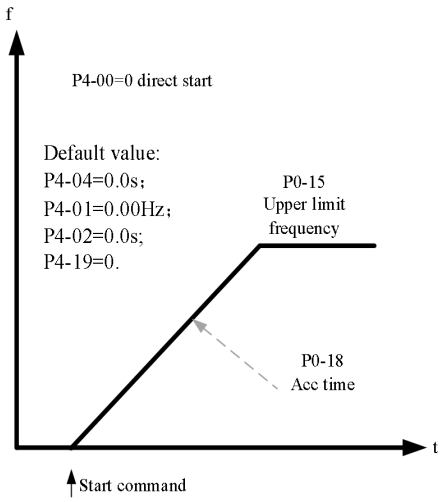
3-3-2. Start mode

There are three starting modes of inverter, which are direct starting, speed tracking restart and asynchronous machine pre-excitation starting. They are selected by function parameter P4-00.

3-3-2-1. Direct start

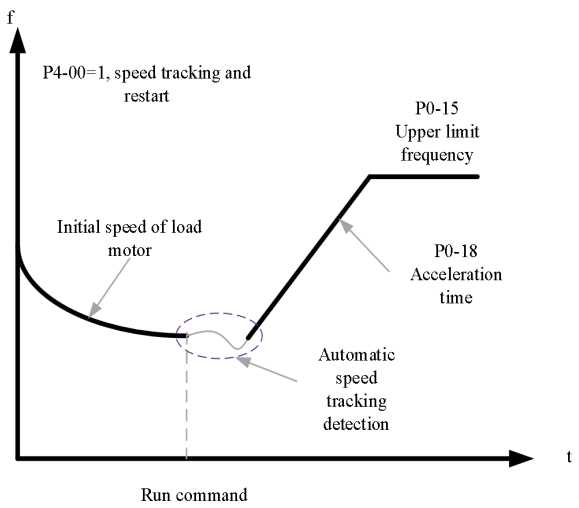
Parameter	Name	Setting value	Note
P4-00	Start mode	0	Direct start mode is applicable to most small inertia loads. The frequency curve of start-up process is shown in the following figure. The "DC braking" function before startup is applicable to the driving of elevator and heavy load, the starting frequency is applicable to the equipment which needs to impact start, such as cement mixer equipment.

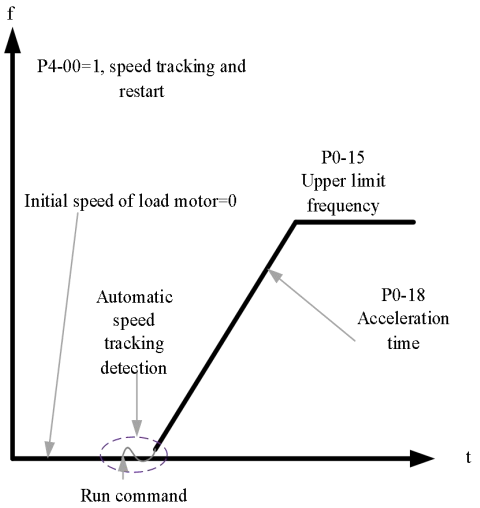




3-3-2-2. Speed tracking restart

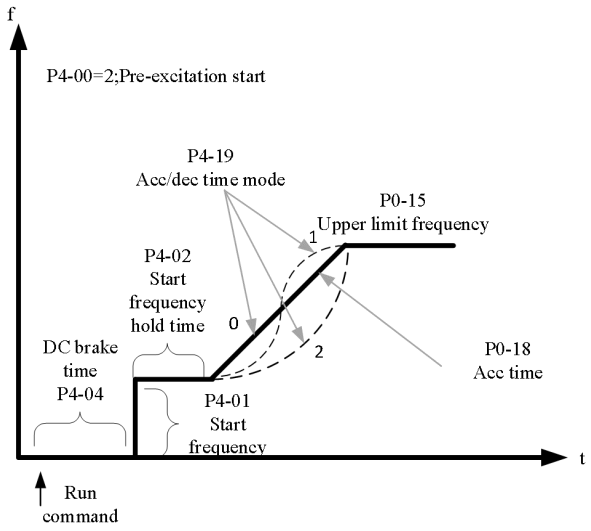
Parameter	Name	Setting value	Note
P4-00	Start mode	1	Speed tracking restart mode is applicable to the large inertia mechanical load. The frequency curve of starting process is shown in the following figure. If the load motor is still running on inertia when the inverter is started, the speed tracking and restart can avoid the over-current.

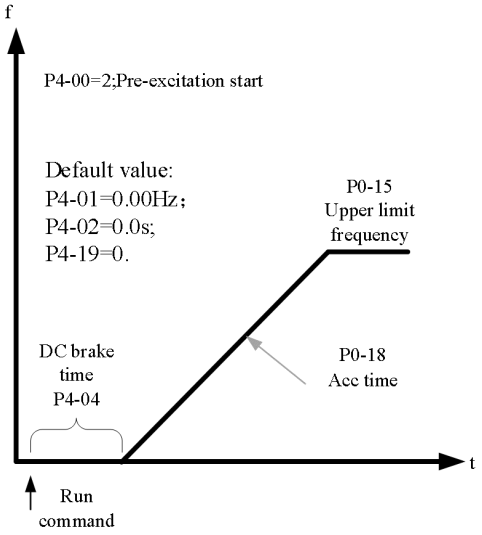




3-3-2-3. Pre-excitation start

Parameter	Name	Setting value	Note
P4-00	Start mode	2	Pre-excitation starting mode is only suitable for asynchronous motor load. Pre-excitation before starting can improve the fast response characteristics of induction motor and meet the application requirements of short acceleration time.

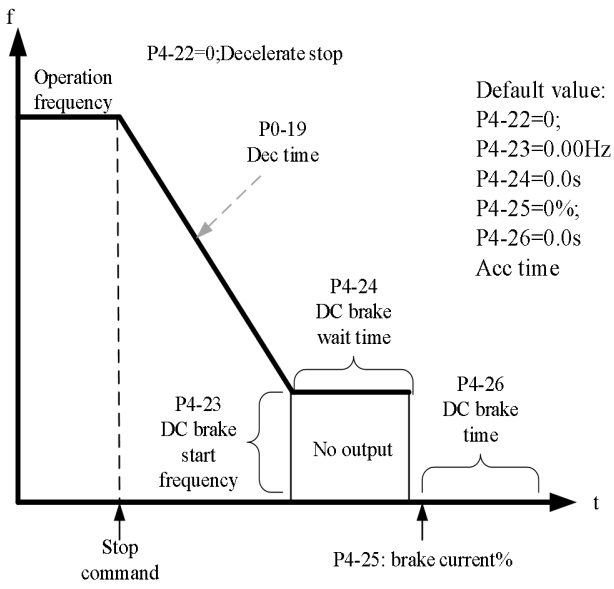


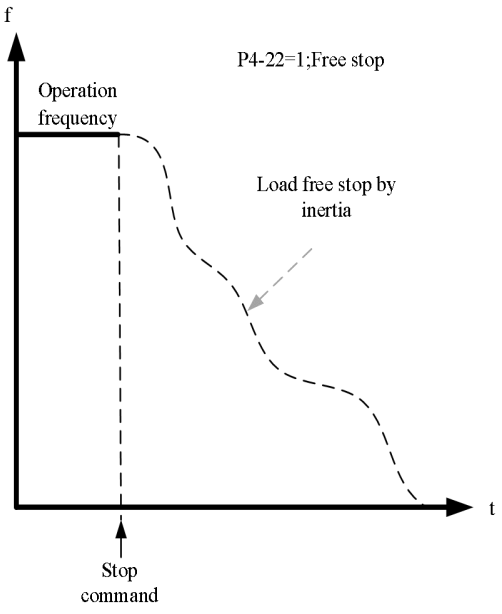


3-3-3. Stop mode

There are two stop modes of inverter, namely deceleration stop and free stop, which are selected by function code P4-22.

Parameter	Name	Setting value	Note
P4-22	Stop mode	0	The inverter stops according to the deceleration time
		1	Free stop, inverter stop output immediately, motor stop freely by inertia





Under the VF control mode, if the actual acceleration time of the motor is much longer than the set acceleration time, the following measures can be taken:

Frequency setting	Measures
Target frequency is less than 2 times rated frequency	Increase P5-19 (VF over current stall action current) and adjust it by 10% each time. If P5-19 setting value exceeds 170%, it is easy to cause ERR10 (inverter overload fault)
The target frequency is 3 times or more than 4 times the rated frequency	In the process of rapid acceleration, motor stall is likely to occur. Therefore, P5-22 (VF over current stall action current compensation coefficient)can be adjusted, and the set value is 100%.

Under the VF control mode, if it is found that the actual deceleration time of the motor is much longer than the set deceleration time, the following measures can be taken:

Braking resistor / Energy feedback unit	Measures
None	The set value of P5-16 (VF over excitation gain) can be increased by ± 20 each time. After increasing the over excitation gain, if the motor oscillation overvoltage fault is caused, please reduce the set value of P5-26(Over voltage stall suppression voltage gain).
Yes (input voltage of inverter is 323~437V)	Adjust P7-52 to 690V and P5-16 (Overexcitation gain) to 0.
	Using Shutdown DC braking, the recommended setting values: P4-23 =0.5Hz, P4-25=50%, P4-24= 1s

Note: When using braking resistor: P5-16 (Overexcitation gain) is set to 0, otherwise it is easy to cause excessive current during operation. P5-24 (Overvoltage stall enable) is set to 0, otherwise the deceleration time may be too long.

3-4. VFD operation frequency

The inverter is equipped with two frequency setting channels, named as main frequency source A and auxiliary frequency source B, which can work in a single channel or switch at any time, or even set calculation method for combination, so as to meet the different control requirements of the application site.

Set through function code P0-05

Parameter	Range	Note
P0-05	Ones bit (0~2)	0: Main frequency source A 1: Main frequency source operation result 2: Switch between main frequency source A and auxiliary frequency source B
	Tens bit (0~3)	0: A+B 1: A-B 2: Larger one of A and B 3: Smaller one of A and B

3-5. Swing frequency function

The swing frequency function refers to the frequency output of the inverter, which swings up and down with the set frequency as the center. In the textile and chemical fiber processing equipment, the frequency swing function can improve the evenness of the spindle winding. The relevant parameters are as follows:

Parameter	Name	Range
A0-05	Swing frequency setting mode	0: Relative to center frequency 1: Relative to the max frequency

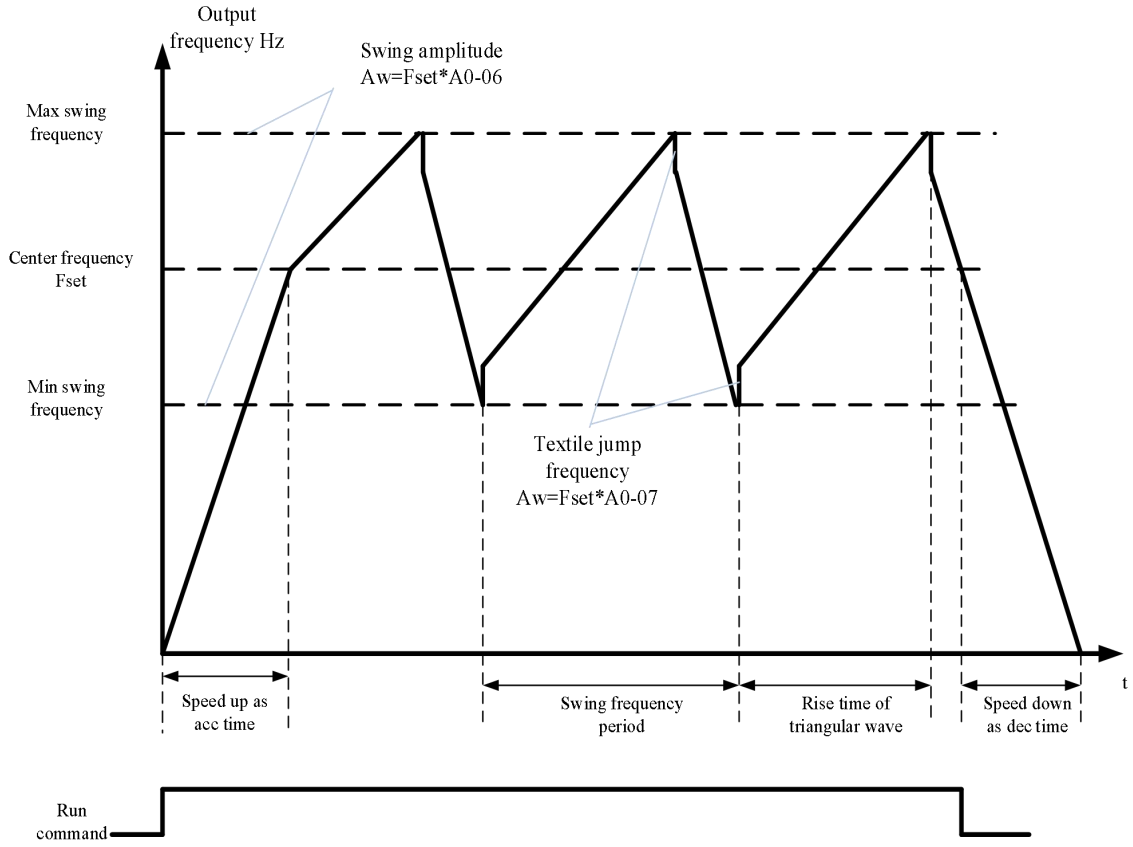
A0-06	Swing frequency amplitude	0.0%～100.0%
A0-07	Jump frequency amplitude	0.0%～50.0%
A0-08	Swing frequency period	0.1s～3600.0s
A0-09	Triangular rise time of swing frequency	0.1%～100.0%

The reference value of swing amplitude is determined by parameter A0-05.

0: Relative to the center frequency (P0-03 frequency source), variable swing system. The swing varies with the center frequency (set frequency).

1: Relative to the maximum frequency (P0-13) is a fixed swing amplitude system.

When the swing frequency is relative to the center frequency (A0-05=0), the trajectory on the time axis is shown as follows:



A0-06 swing amplitude AW:

When swing amplitude is relative to the center frequency (A0-05=0), AW＝frequency source P0-05×A0-06.

When swing amplitude is relative to the max frequency (A0-05=1), AW＝max frequency P0-06×A0-06.

A0-08 swing frequency period: time value of a complete frequency swing period.

A0-07 Jump frequency amplitude:

The jump frequency amplitude is the percentage of the jump frequency relative to the swing amplitude when the swing frequency is running, that is, the jump frequency = swing amplitude AW × jump frequency amplitude A0-07.

If the swing is relative to the center frequency (A0-05=0), the jump frequency is the variable value. If the swing is relative to the maximum frequency (A0-05=1), the jump frequency is a fixed value. The swing operating frequency is constrained by the upper and lower limit frequencies.

A0-09 triangle wave rise time coefficient: it is the time percentage of triangle wave rise time relative to frequency swing period A0-08.

Triangle wave rise time (s) ＝swing frequency period A0-08× A0-09,

Triangle wave fall time (s) ＝swing frequency period A0-08× (1— A0-09).

3-6. Motor parameters and tuning

3-6-1. Motor parameter setting

When the inverter operates in vector control (P0-01 = 1 or 2) mode, it is required to set correct motor parameters, which is different from VF (P0-01 = 0) mode.

Motor parameters 1	Description	Note
P1-01~P1-05	Motor rated power / voltage / current / frequency / speed	Model parameters, manual input
P1-06~P1-10	Equivalent stator resistance, inductance and rotor inductance of the motor	Tuning parameters, tuning obtained

Motor parameters 2 for multi-motor system

Motor parameters 2	Description	Note
A2-01~A2-05	Motor rated power / voltage / current / frequency / speed	Model parameters, manual input
A2-06~A2-10	Equivalent stator resistance, inductance and rotor inductance of the motor	Tuning parameters, tuning obtained

3-6-2. Motor tuning

The methods to get the internal electrical parameters of the controlled motor are: dynamic tuning, static tuning, manual input of motor parameters and so on.

Tuning mode	Suitable condition	Effect
No load dynamic tuning	It is suitable for asynchronous motor. The situation where the motor and application system are easy to separate.	Best
With load dynamic tuning	It is suitable for asynchronous motor. The situation where the motor and application system are not easy to separate	General
Static tuning 1	It is only suitable for asynchronous motor, where motor and load are difficult to separate and dynamic tuning operation is not allowed, P1-09 and P1-10 are not tuned.	General
Static tuning 2	It is only suitable for asynchronous motor, where motor and load are difficult to separate and dynamic tuning operation is not allowed. Compared with static tuning 1, the tuning time is relatively long and the tuning effect is good. This mode is recommended for static tuning.	Better
Manual input parameters	For asynchronous motors only. When it is difficult to separate the motor from the application system, copy the motor parameters of the same model that have been successfully tuned by the inverter to the corresponding function codes of P1-00 ~ P1-10.	General

The automatic tuning procedure of motor parameters is as follows:

The following is an example of parameter tuning method of default motor 1. The tuning method of motor 2 is the same as that, but the function code number should be changed accordingly.

Step 1: If the motor can be completely disconnected from the load, in case of power failure, the motor is separated from the load part mechanically, so that the motor can rotate freely without load.

Step 2: After power on, select the first motor control mode (P0-01) as open-loop vector, and then select the

command source of inverter (P0-02) as the operation panel.

Step 3: Input the nameplate parameters of the motor accurately (for example P1-00 ~ P1-05), please input the following parameters according to the actual parameters of the motor (select according to the current motor):

Motor selection	Parameter
Motor 1	P1-00: Motor type P1-01: Motor rated power P1-02: Motor rated voltage P1-03: Motor rated current P1-04: Motor rated frequency P1-05: Motor rated speed
Motor 2	A2-00～A2-05: Same to above definitions

Step 4: If it is an asynchronous motor, P1-35 (tuning selection, motor 2 corresponds to A2-35) please select 2 (motor rotation self-learning), press ENT to confirm, at this time, the keyboard displays TUNE.

Then press the RUN key on the keyboard panel, the inverter will drive the motor to accelerate and decelerate, forward and reverse operation, the operation indicator will light up, and the tuning operation lasts for about 2 minutes. When the above display information disappears, it will return to the normal parameter display state, indicating that the tuning is completed.

After the dynamic tuning, the inverter will automatically calculate the following parameters of the motor:

Motor selection	Parameter
Motor 1	P1-06: Asynchronous motor stator resistance P1-07: Asynchronous motor rotor resistance P1-08: Asynchronous motor leakage inductance P1-09: Asynchronous motor interaction inductive reactance P1-10: Asynchronous motor no load current
Motor 2	A2-06~A2-10: Same to above definition

If the motor cannot be completely disconnected from the load, select 1 (1: Static self-learning 1) in P1-35 (motor 2 is A2-35), and then press run on the keyboard panel to start the tuning operation of motor parameters.

3-7. Using method of terminal X

When out of factory, P2-16 = 0000, P2-17 = 0000. When X is short circuited, the signal is valid (logic 1), when X terminal is suspended, the signal is invalid (logic 0).

The user can also change the effective mode of the X terminal, that is, when the X terminal is short circuited, it is an invalid (logic 0) signal, when the X terminal is suspended, it is an effective (logic 1) signal. At this time, the corresponding bits of P2-16 and P2-17 need to be changed to 1.

The inverter also has software filtering time (P2-12) for the input signal X, which can improve the anti-interference level.

For the X1-X3 input, the port signal delay function is specially provided to facilitate some applications requiring delay processing.

The functions of the above four X terminals can be defined in P2-00 ~ P2-03, and each X can be selected from 51 functions as required. Refer to the detailed description of P2-00 ~ P2-03 for details.

3-8. Using method of terminal Y

VH5 VFD has two channels of output, which are Y1 and TA/TB/TC, wherein Y1 is transistor output, which can drive 24VDC low-voltage signal circuit, TA/TB/TC is relay output, and can drive 220VAC control circuit and DC24V control circuit.

By setting the value of P3-01 to P3-05, output function of each channel can be defined. It can be used to indicate various working states and alarms of the inverter. There are about 40 function settings in total, so that the user can realize specific automatic control requirements. Please refer to the detailed description of group P3 parameters.

3-9. Using method of terminal AI

VH5 supports 1 channel of AI terminal.

Terminal	Input signal
AI1-GND	Voltage 0 ~ 10V Current 0 ~ 20mA

AI can be used when using external voltage and current signal to set frequency, torque, voltage of VF separated, PID or feedback. The voltage or current value corresponding to the actual given or feedback physical quantity relationship is set through P2-18 ~ P2-45.

The sampling value of AI can be read in U group function code, the converted calculation value is used for internal subsequent calculation, and users cannot read it directly.

3-10. Using method of terminal AO

VH5 supports one channel AO output.

Terminal	Output signal
AO-GND	Voltage 0 ~ 10V Current 0 ~ 20mA

AO can be used to indicate the internal operation parameters in analog mode. The indicated parameter attributes can be modified through P3-13 before output. The modified characteristic curve Y = kX + b, where x is the operation parameter to be output, and the k and b of AO can be set by function codes P3-15 and P3-16.

4. Function parameters

4-1. Function code list

‘○’: Parameters can be modified during operation.
‘×’: Parameters cannot be modified during operation.
‘—‘: Read only, user cannot change.

Group P0: Basic operation parameters

Group P0: basic operation parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P0-01	First motor control mode selection	0: VF control mode 1: No speed sensor vector control (SVC)	0	×	0001H
P0-02	Operation command channel selection	0: Operation panel 1: Terminal operation 2: Communication	0	○	0002H
P0-03	Main frequency source A selection	0: Digital setting (Power-off no memory) 1: Digital setting (Power-off memory) 2: AI **(supported by 3744 and above versions)** 3: AI **(Below 3744 version)** 6: Communication setting 7: Multi-segment command setting 8: PID setting 9: Simple PLC operation 10: Specific mode for wire drawing and winding (supported by **3720 and above versions**) 11: LED panel knob setting(supported by **3730 and above versions**)	0	×	0003H
P0-04	Auxiliary frequency source B selection	0: Digital setting (Power-off no memory) (Power-off no memory)1: Digital setting (Power-off memory)(Power-off memory) 2: AI **(supported by 3744 and above versions)** 3: AI **(Below 3744 version)** 6: Communication setting 7: Multi-segment command setting 8: PID setting 9: Simple PLC operation 10: Specific mode for wire drawing and winding (supported by **3740 and above versions**) 11: LED panel knob setting(supported by **3740 and above versions**)	0	×	0004H

Group P0: basic operation parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P0-05	Frequency source superposition selection	Ones bit: Frequency source selection 0: Main frequency source A 1: Calculation results of main and auxiliary frequency sources 2: Switching between main frequency source A and auxiliary frequency source B Tens bit: The operation relationship of main and auxiliary frequency sources 0: A+B 1: A-B 2: Max (A, B) 3: Min (A, B)	00	○	0005H
P0-06	Auxiliary frequency source B range selection	0: Relative to the max output frequency 1: Relative to the main frequency source A	0	○	0006H
P0-07	Auxiliary frequency source B range	0%~150%	100%	○	0007H
P0-09	Digital setting of auxiliary frequency source offset when superposition	0.00Hz~max output frequency P0-13	0.00Hz	○	0009H
P0-10	Preset frequency	0.00Hz~max output frequency P0-13	50Hz	○	000AH
	Frequency instruction decimal point (supported by **3740 and above versions**)	pointpoint			
P0-12	Frequency stop memory selection for digital setting	0: No memory 1: Memory	1	○	000CH
P0-13	Max output frequency	50.00Hz~600.00Hz	50.00Hz	×	000DH
P0-14	Upper limit frequency source	0: Set by P0-15 1: AI (supported by 3744 and above versions) 2: AI (Below 3744 version) 5: Communication setting	0	×	000EH
P0-15	Upper limit frequency	Lower limit frequency P0-17~ max output frequency P0-13	50.00Hz	○	000FH
P0-16	Upper limit frequency offset	0.00Hz~ max output frequency(P0-13)	0.00Hz	○	0010H
P0-17	Lower limit frequency	0.00Hz~ upper limit frequency(P0-15)	0.00Hz	○	0011H
P0-18	Acceleration time 1	0~65000s (PC-09=0) 0.0~6500.0s (PC-09=1) 0.00~650.00s (PC-09=2)	Model setting	○	0012H
P0-19	Deceleration time 1	0~65000s (PC-09=0) 0.0~6500.0s (PC-09=1) 0.00~650.00s (PC-09=2)	Model setting	○	0013H
P0-20	Operation direction	Ones bit: Operation direction 0: Default operation direction 1: Run in the opposite direction to the default	00	○	0014H

Group P0: basic operation parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
		direction Tens bit: Prohibit inversion (supported by 3720 and above versions) 0: Invalid 1: Valid			
P0-21	Reverse frequency prohibition (supported by 3720 and above versions)	0: Valid 1: Invalid	0	○	0015H
P0-22	Dead time of forward and reverse rotation	0.0s~3600.0s	0.0s	○	0016H
P0-23	Frequency command UP/DOWN base when operation	0: Operating frequency 1: Set frequency	0	×	0017H
P0-25	Motor parameter group selection	0: Motor parameter group 1 1: Motor parameter group 2	0	×	0019H

Group P1: First motor parameters

Group P1: first motor parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P1-00	Motor type selection	0: Common asynchronous motor	0	×	0100H
P1-01	Motor rated power	0.1kW~650.0kW	Model setting	×	0101H
P1-02	Motor rated voltage	1V~1200V	Model setting	×	0102H
P1-03	Motor rated current	0.01A~655.35A (VFD power ≤55kW) 0.1A~6553.5A (VFD power >55kW)	Model setting	×	0103H
P1-04	Motor rated frequency	0.01Hz~ max output frequency	Model setting	×	0104H
P1-05	Motor rated speed	1rpm~65535rpm	Model setting	×	0105H
P1-06	Asynchronous motor stator resistance	0.001Ω～65.535Ω (VFD power ≤55kW) 0.0001Ω～6.5535Ω (VFD power >55kW)	Tuning parameter	×	0106H
P1-07	Asynchronous motor rotor resistance	0.001Ω～65.535Ω (VFD power ≤55kW) 0.0001Ω～6.5535Ω (VFD power >55kW)	Tuning parameter	×	0107H
P1-08	Leakage inductance of induction motor	0.01mH～655.35mH (VFD power ≤55kW) 0.001mH～65.535mH (VFD power >55kW)	Tuning parameter	×	0108H
P1-09	Mutual inductance of induction motor	0.01mH～655.35mH (VFD power ≤55kW) 0.001mH～65.535mH (VFD power >55kW)	Tuning parameter	×	0109H
P1-10	No load current of asynchronous motor	0.01A～P1-03 (VFD power ≤55kW) 0.1A～P1-03 (VFD power >55kW)	Tuning parameter	×	010AH
P1-35	Self learning of motor parameters	Ones bit: 0: No operation	0	×	0123H

Group P1: first motor parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
		1: Static tuning 1 (part of parameters) 2: Dynamic tuning 3: Static tuning 2 Tens bit: 0: Asynchronous motor 1: Synchronous motor			

Group P2: Input terminal function parameters

Group P2: Input terminal function parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P2-00	Input terminal X1 function selection	0: No function 1: FWD or RUN command 2: REV or FWD/REV operation direction (Note: when it is set to 1 or 2, it should be used with P2-10. See the parameter for details) 3: Three wire mode operation control 4: Forward jog (FJOG) 5: Reverse jog (RJOG) 6: Terminal UP 7: Terminal DOWN 8: UP/DOWN setting clear 9: Free stop 10: Fault reset 11: Frequency source switching 12: Multi-segment command terminal 1 13: Multi-segment command terminal 2 14: Multi-segment command terminal 3 15: Multi-segment command terminal 4 16: Acc/Dec time selection terminal 1 17: Acc/Dec time selection terminal 2 18: Acc/Dec prohibit 20: Counter input 21: Counter reset 22: Length counter input 23: Length counter reset 24: Swing frequency pause 25: Operation pause 26: PLC status reset 27: Run command switch to keyboard 28: Run command switch to communication 29: Torque control prohibited 30: Switch between speed control and torque control 32: PID pause 33: PID reverse direction of action	01	×	0200H
P2-01	Input terminal X2 function selection		02	×	0201H
P2-02	Input terminal X3 function selection		10	×	0202H
P2-03	Input terminal X4 function selection		00	×	0203H

Group P2: Input terminal function parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
		34: PID integral pause 35: PID parameter switching 36: External fault normally open input 37: External fault normally close input 38: User-defined fault 1 39: User-defined fault 2 40: Motor parameter selection 41: Switch between main frequency source A and preset frequency 42: Switch between auxiliary frequency source B and preset frequency 43: Frequency setting valid terminal 44: DC braking 45: Deceleration DC braking 46: Emergency stop 47: External stop terminal 1(only valid for panel control) 48: External stop terminal 2(according to deceleration time 4) 49: Prohibit inversion 50: The running time is cleared 51: Two wire / three wire switching			
P2-10	XI terminal command mode	0: Two wire mode 1 1: Two wire mode 2 2: Three wire mode 1 3: Three wire mode 2	0	×	020AH
P2-11	XI terminal UP/DOWN changing rate	0.001Hz/s~50.000Hz/s	1.000Hz/s	○	020BH
P2-12	XI terminal filtering time	0.000s~1.000s	0.010s	○	020CH
P2-13	X1 delay time	0.0s~3600.0s	0.0s	×	020DH
P2-14	X2 delay time	0.0s~3600.0s	0.0s	×	020EH
P2-15	X3 delay time	0.0s~3600.0s	0.0s	×	020FH
P2-16	XI terminal valid status selection 1	0: Low level valid 1: High level valid Ones bit: X1 Tens bit: X2 Hundreds bit: X3 Thousands bit: X4	00000	×	0210H
P2-18	AI curve 1 min setting	0.00V ~ P2-20	0.00V	○	0212H
P2-19	AI curve 1 min setting corresponding frequency percentage	-100.0% ~ +100.0%	0.0%	○	0213H
P2-20	AI curve 1 max setting	P2-18 ~ +10.00V	10.00V	○	0214H
P2-21	AI curve 1 max setting corresponding frequency	-100.0% ~ +100.0%	100.0%	○	0215H

Group P2: Input terminal function parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
	percentage				
P2-22	AI curve 2 min setting	0.00V ~ P2-24	0.00V	○	0216H
P2-23	AI curve 2 min setting corresponding frequency percentage	-100.0% ~ +100.0%	0.0%	○	0217H
P2-24	AI curve 2 max setting	P2-22 ~ +10.00V	10.00V	○	0218H
P2-25	AI curve 2 max setting corresponding frequency percentage	-100.0% ~ +100.0%	100.0%	○	0219H
P2-26	AI curve 3 min setting	0.00V ~ P2-28	0V	○	021AH
P2-27	AI curve 3 min setting corresponding frequency percentage	-100.0% ~ +100.0%	0.0%	○	021BH
P2-28	AI curve 3 max setting	P2-26 ~ +10.00V	10.00V	○	021CH
P2-29	AI curve 3 max setting corresponding frequency percentage	-100.0% ~ +100.0%	100.0%	○	021DH
P2-30	AI curve 4 min setting	0.00V ~ P2-32	0.00V	○	021EH
P2-31	AI curve 4 min setting corresponding frequency percentage	-100.0% ~ +100.0%	0.0%	○	021FH
P2-32	AI curve 4 inflection point 1 setting	P2-30 ~ P2-34	10.00V	○	0220H
P2-33	AI curve 4 inflection point 1 setting corresponding frequency percentage	-100.0% ~ +100.0%	100.0%	○	0221H
P2-34	AI curve 4 inflection point 2 setting	P2-32 ~ P2-36	0.00V	○	0222H
P2-35	AI curve 4 inflection point 2 setting corresponding frequency percentage	-100.0% ~ +100.0%	0.0%	○	0223H
P2-36	AI curve 4 max setting	P2-34 ~ +10.00V	10.00V	○	0224H
P2-37	AI curve 4 max setting corresponding frequency percentage	-100.0% ~ +100.0%	100.0%	○	0225H
P2-38	AI curve 5 min setting	-10.00V ~ P2-40	0V	○	0226H
P2-39	AI curve 5 min setting corresponding frequency percentage	-100.0% ~ +100.0%	0.0%	○	0227H
P2-40	AI curve 5 inflection point 1 setting	P2-38 ~ P2-42	10.00V	○	0228H
P2-41	AI curve 5 inflection point 1 setting corresponding	-100.0% ~ +100.0%	100.0%	○	0229H

Group P2: Input terminal function parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
	frequency percentage				
P2-42	AI curve 5 inflection point 2 setting	P2-40 ~ P2-44	0.00V	○	022AH
P2-43	AI curve 5 inflection point 2 setting corresponding frequency percentage	-100.0% ~ +100.0%	0.0%	○	022BH
P2-44	AI curve 5 max setting	P2-42 ~ +10.00V	10.00V	○	022CH
P2-45	AI curve 5 max setting corresponding frequency percentage	-100.0% ~ +100.0%	100.0%	○	022DH
P2-54	AI curve selection	**Onesbit:** AI curve selection (3744 and above versions) 1: Curve 1 (2 points, see P2-18 ~ P2-21) 2: Curve 2 (2 points, see P2-22 ~ P2-25) 3: Curve 3 (2 points, see P2-26 ~ P2-29) 4: Curve 4 (4 points, see P2-30 ~ P2-37) 5: Curve 5 (4 points, see P2-38 ~ P2-45) **Tens bit:** AI curve selection, ditto (below 3744 version)	321	○	0236H
P2-55	AI below minimum input setting selection	Ones bit: AI below minimum input setting selection (3744 and above versions) 0: Corresponding minimum input setting 1: 0.0% Tens bit: AI below minimum input setting selection (below 3744 version)	000	○	0237H
P2-56	AI filter time constant	0.00s~10.00s	0.10s	○	0238H
P2-62	AI jump point	-100.0% ~ +100.0%	0.0%	○	023EH
P2-63	AI jump range	0.0% ~ 100.0%	0.5%	○	023FH

Group P3: Output terminal function parameters

Group P3: Output terminal function parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P3-01	Y1 output function selection	0: No output 1: Inverter in operation 2: Fault output (stop fault) 3: Frequency level detection FDT1 output 4: Frequency level detection FDT2 output 5: Frequency arrival 6: Zero speed operation (no output when stop) 7: Zero speed operation 2 (output when stop) 8: Upper limit frequency arrival 9: Lower limit frequency arrival (no output	01	○	0300H
P3-04	Relay 1 output function selection		02	○	0304H

Group P3: Output terminal function parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
		when stop) 10: Motor overload alarm 11: Inverter overload alarm 12: Communication setting 13: In torque limit 15: Frequency 1 arrival output 16: Frequency 2 arrival output 17: Current 1 arrival output 18: Current 2 arrival output 21: Ready for operation 23: AI input overrange (supported by 3744 and above versions) 24: Under voltage status output 25: Cumulative power on time arrival 26: Timing arrival output 27: Length arrival output 28: Simple PLC cycle completed 29: Cumulative running time arrival 32: Lower limit frequency arrival (output when stop) 33: Fault output (stop fault and no output under voltage) 34: Module temperature arrival 35: Fault output (output only after fault stop) 37: In reverse operation 39: Output current overrange 40: Zero current status 41: Current operation time arrival 42: Bus voltage arrival			
P3-06	Y1 output delay time	0.0s~3600.0s	0.0s	○	0306H
P3-09	Relay 1 output delay time	0.0s~3600.0s	0.0s	○	0309H
P3-11	Y terminal effective state selection	0: Positive logic 1: Negative logic Ones bit: Y1 Thousands bit: Relay 1	00000	○	030BH
P3-13	AO output selection	0: Operating frequency 1: Set frequency 2: Output current 3: Motor output torque (absolute value, percentage relative to motor) 4: Output power 5: Output voltage 6: AI (3744 and above versions) 7: AI (below 3744 version) 10: Output speed 11: Communication control 12: Count value	00	○	030DH

Group P3: Output terminal function parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
		13: Length			
P3-15	AO zero bias coefficient	-100.0%~+100.0%	0.0%	○	0311H
P3-16	AO gain	-10.00~+10.00	1.00	○	0312H

Group P4: Start/Stop mode

Group P4: Start stop mode					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P4-00	Start mode	0: Direct start 1: Speed tracking restart (AC asynchronous motor) 2: Pre-excitation start (AC asynchronous motor)	0	○	0400H
P4-01	Starting frequency	0.00Hz~10.00Hz	0.00Hz	○	0401H
P4-02	Start frequency duration	0.0s~100.0s	0.0s	×	0402H
P4-03	Percentage of starting DC braking current and pre-excitation current	0%~100%	0%	×	0403H
P4-04	DC braking time / pre-excitation time at start-up	0.0s~100.0s	0.0s	×	0404H
P4-05	Start protection selection	0: No protection 1: Protection	0	×	0405H
P4-06	Speed tracking mode (Only valid for asynchronous motors)	0: Start from shutdown frequency 1: Starting from power frequency 2: Start at maximum output frequency	0	×	0406H
P4-07	Speed tracking speed	1~100	20	○	0407H
P4-10	Speed tracking closed loop current	30%~200%	Model confirmed	×	040AH
P4-19	Acceleration and deceleration mode	0: Linear acceleration and deceleration 1: Continuous S-curve acceleration and deceleration 2: Intermittent S-curve acceleration and deceleration	0	×	0413H
P4-20	Time proportion at the beginning of the S curve	0.0%~ (100.0% - P4-21)	30.0%	×	0414H
P4-21	Time proportion at the end of the S curve	0.0%~ (100.0% - P4-20)	30.0%	×	0415H
P4-22	Stop mode	0: Deceleration stop 1: Free stop	0	○	0416H
P4-23	Starting frequency of DC braking during shutdown	0.00Hz~P0-13	0.00Hz	○	0417H
P4-24	DC braking waiting time	0.0s~100.0s	0.0s	○	0418H

Group P4: Start stop mode					
Parameter	Name	Setting range	Default value	Modify	Modbus address
	during shutdown				
P4-25	Percentage of DC braking current when shutdown	0%~100%	0%	○	0419H
P4-26	DC braking time during shutdown	0.0s~100.0s	0.0s	○	041AH

Group P5: VF parameters

Group P5: VF parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P5-00	VF curve selection	0: Linear VF 1: Multipoint VF 2: Square VF 3: the 1.2nd power VF 4: the 1.4th power VF 6: the 1.6th power VF 8: the 1.8th power VF 10: VF complete separation mode 11: VF semi separation mode	00	×	0500H
P5-01	Multi-point VF frequency point F1	0.00Hz~P5-03	0.00Hz	×	0501H
P5-02	Multi-point VF voltage point V1	0.0~100.0%	0.0%	×	0502H
P5-03	Multi-point VF frequency point F2	P5-01~P5-05	0.00Hz	×	0503H
P5-04	Multi-point VF voltage point V2	0.0~100.0%	0.0%	×	0504H
P5-05	Multi-point VF frequency point F3	P5-05~P1-04 (motor rated frequency)	0.00Hz	×	0505H
P5-06	Multi-point VF voltage point V3	0.0~100.0%	0.0%	×	0506H
P5-07	Torque boost	0.0% (Automatically torque boost) 0.1%~30.0%	Model setting	○	0507H
P5-08	Cut-off frequency of torque boost	0.00Hz~ P0-13	50.00Hz	×	0508H
P5-09	VF separated voltage source	0: Digital setting 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting 6: Multi-speed command 7: PID setting 8: Simple PLC operation	0	○	0509H

Group P5: VF parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P5-10	VF separated voltage source digital setting	0~Motor rated voltage	0V	○	050AH
P5-11	VF separated voltage acceleration time	0.0s~1000.0s	0.0s	○	050BH
P5-12	VF separated voltage deceleration time	0.0s~1000.0s	0.0s	○	050CH
P5-13	VF separated stop mode selection	0: The frequency voltage reduced to 0 independently 1: When the voltage decreases to zero, the frequency begins to decrease again	0	○	050DH
P5-14	VF slip compensation gain	0.0%~200.0%	0.0%	○	050EH
P5-15	Slip compensation time constant	0.1~10.0s	0.1s	○	050FH
P5-16	VF over excitation gain	0~200	64	○	0510H
P5-17	VF oscillation suppression gain	0~100	Model setting	○	0511H
P5-18	VF oscillation suppression mode selection	0~4	3	×	0512H
P5-19	VF over current stall action current	50~200%	150%	×	0513H
P5-20	VF over current stall suppression enable	0: Invalid 1: Valid	1	×	0514H
P5-21	VF over current stall suppression gain	0~100	20	○	0515H
P5-22	VF overcurrent stall action current compensation coefficient	50%~200%	50	×	0516H
P5-23	Overvoltage stall action voltage	200.0V~2000.0V	Model setting	×	0517H
P5-24	Overvoltage stall enable	0: invalid 1: valid	1	×	0518H
P5-25	Over voltage stall suppression frequency gain	0~100	30	○	0519H
P5-26	Over voltage stall suppression voltage gain	0~100	30	○	051AH
P5-27	Limit of maximum rise frequency of over voltage stall	0~50Hz	5Hz	×	051BH
P5-34	PID shutdown reference voltage (supported by versions 3740 and above)	0.0~1000.0V	780.0V	○	0522H
P5-35	PID shutdown proportional gain (supported in versions	0~65535	500	○	0523H

Group P5: VF parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
	3740 and above)				
P5-36	PID shutdown integral gain (supported in versions 3740 and above)	0~65535	200	○	0524H
P5-37	PID shutdown differential gain(supported in versions 3740 and above)	0~65535	100	○	0525H
P5-38	PID reference time for parabolic shutdown (supported in versions 3740 and above)	0.0~4200.0s	20.0s	○	0526H
P5-39	Selection of deceleration shutdown (supported in versions 3740 and above)	0: Linear deceleration shutdown 1: Parabolic deceleration shutdown 2: PID deceleration shutdown	0	○	0527H

Group P6: Vector control parameters

Group P6: Vector control parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P6-00	Speed loop proportional gain 1	1~100	30	○	0600H
P6-01	Speed loop integration time 1	0.01s~10.00s	0.50s	○	0601H
P6-02	Speed loop proportional gain 2	1~100	20	○	0602H
P6-03	Speed loop integration time 2	0.01s~10.00s	1.00s	○	0603H
P6-04	Switching frequency 1	0.00~P6-05	5.00Hz	○	0604H
P6-05	Switching frequency 2	P6-04~ P0-13 max output frequency	10.00Hz	○	0605H
P6-06	Integral attribute of speed loop	Ones bit: integral separation 0: invalid 1: valid	0	○	0606H
P6-07	Vector slip compensation coefficient	50%~200%	Model setting	○	0607H
P6-08	SVC speed feedback filter time	0.000s~0.100s	0.015s	○	0608H
P6-10	Speed control (drive) torque upper limit source	0: Set by P6-11 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting	0	○	060AH
P6-11	Speed control (drive) torque upper limit digital	0.0%~200.0%	150.0%	○	060BH

Group P6: Vector control parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
	setting				
P6-14	Proportional gain of excitation regulation	0 ~ 60000	2000	○	060EH
P6-15	Integral gain of excitation regulation	0 ~ 60000	1300	○	060FH
P6-16	Torque regulated proportional gain	0 ~ 60000	2000	○	0610H
P6-17	Integral gain of torque regulation	0 ~ 60000	1300	○	0611H

Group P7: Fault parameters

Group P7: Fault parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P7-00	Third time (last) fault type	0: No fault 1: Acceleration over current 2: Deceleration over current 3: Constant speed over current 4: Acceleration overvoltage 5: Deceleration overvoltage 6: Constant speed overvoltage 7: Buffer resistance overload fault 8: Under voltage fault 9: Inverter overload 10: Motor overload 11: Input phase loss 12: Output phase loss 13: Radiator overheating 14: Contactor fault 15: Current detection fault 16: Motor tuning fault 17: Code disk failure 18: Short circuit fault of motor to ground 19: Load drop 20: Wave by wave current limiting fault 22: UVW signal feedback error 23: Brake resistance short circuit 24: Brake pipe overload 25: Brake pipe straight through 26: SVC stall fault 43: External fault 44: Communication failure 45: EEPROM read / write failure 46: Operation time arrival	-	-	-
P7-01	Second time fault type		-	-	-
P7-02	First time fault type		-	-	-

Group P7: Fault parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
		47: Power on time arrival 48: User defined fault 1 49: User defined fault 2 50: PID feedback loss during operation 51: Running switch motor 52: Speed feedback deviation too large 53: Motor over speed 54: Motor over temperature fault 55: Point to point slave failure 56: Power on lock time has arrived			
P7-03	Third time (last time) fault frequency	-	-	-	-
P7-04	Third time (last time) fault current	-	-	-	-
P7-05	Third time (last time) fault bus voltage	-	-	-	-
P7-06	Third time (last time) fault input terminal status	-	-	-	-
P7-07	Third time (last time) fault output terminal status	-	-	-	-
P7-08	Third time (last time) fault VFD status	-	-	-	-
P7-09	Third time (last time) fault power on time	Unit:minute	-	-	-
P7-10	Third time (last time) fault operation time	Unit:minute (one decimal place)	-	-	-
P7-11	Location information of the third (latest) fault(supported by 3720 and above versions)	-	-	-	-
P7-13	Second time fault frequency	-	-	-	-
P7-14	Second time fault current	-	-	-	-
P7-15	Second time fault bus voltage	-	-	-	-
P7-16	Second time fault input terminal status	-	-	-	-
P7-17	Second time fault output terminal status	-	-	-	-
P7-18	Second time fault VFD status	-	-	-	-
P7-19	Second time fault power on time	Unit:minute	-	-	-
P7-20	Second time fault	Unit:minute (one decimal place)	-	-	-

Group P7: Fault parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
	operation time				
P7-21	Location information of the second fault(supported by 3720 and above versions)	-	-	-	-
P7-23	First time fault frequency	-	-	-	-
P7-24	First time fault current	-	-	-	-
P7-25	First time fault bus voltage	-	-	-	-
P7-26	First time fault input terminal status	-	-	-	-
P7-27	First time fault output terminal status	-	-	-	-
P7-28	First time fault VFD status	-	-	-	-
P7-29	First time fault power on time	Unit:minute	-	-	-
P7-30	First time fault operation time	Unit:minute (one decimal place)	-	-	-
P7-31	Location information of the first fault(supported by 3720 and above versions)	-	-	-	-
P7-33	Motor overload protection mode selection	0: Forbidden 1: Allow	1	○	0721H
P7-34	Motor overload protection gain	0.20~10.00	1.00	○	0722H
P7-35	Motor overload warning coefficient	50%~100%	80%	○	0723H
P7-39	Input phase lacking/contactor closing protection selection	Ones bit: input phase lacking protection Tens bit: contactor closing protection selection 0: Forbidden 1: Allow	11	○	0727H
P7-40	Output phase lacking protection selection	0: Forbidden 1: Allow	1	○	0728H
P7-41	Power on short circuit protection towards the ground function	0: Invalid 1: Valid	1	○	0729H
P7-42	Action selection of fault relay during automatic fault reset	0: No action 1: Action	0	○	072AH
P7-43	Interval time of automatic fault reset	0.1s~60.0s	1.0s	○	072BH
P7-44	Number of automatic reset of faults	0~20	0	○	072CH
P7-45	Protection action selection	Ones bit: Motor overload (Err 10)	00000	○	072DH

Group P7: Fault parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
	1 when fault	0: Free stop 1: Stop as stop mode Tens bit: Input phase lacking (Err11) 0: Free stop 1: Stop as stop mode Hundreds bit: Output phase lacking (Err12) 0: Free stop 1: Stop as stop mode Thousands bit: Output load drop (Err19) 0: Free stop 1: Stop as stop mode Ten thousand bit: Pole position detection failed (Err21) 0: Free stop 1: Stop as stop mode			
P7-46	Protection action selection 2 when fault	Ones bit: External fault 1 (Err43) 0: Free stop 1: Stop as stop mode Tens bit: Communication error (Err44) 0: Free stop 1: Stop as stop mode Hundreds bit: EEPROM read write error (Err45) 0: Free stop 1: Stop as stop mode Thousands bit: Operation time reached (Err46) 0: Free stop 1: Stop as stop mode Ten thousand bit: Power on time reached (Err47) 0: Free stop 1: Stop as stop mode	00000	○	072EH
P7-47	Protection action selection 3 when fault	Ones bit: User defined fault 1 (Err48) 0: Free stop 1: Stop as stop mode Tens bit: User defined fault 2 (Err49) 0: Free stop 1: Stop as stop mode Hundreds bit: PID feedback lost in operation (Err50) 0: Free stop 1: Stop as stop mode	00	○	072FH

Group P7: Fault parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
		Thousands bit: Speed deviation too large (Err52) 0: Free stop 1: Stop as stop mode Ten thousand bit: Motor over speed (Err53) 0: Free stop 1: Stop as stop mode			
P7-48	Protection action selection 4 when fault	Ones bit: motor overheat (Err54) 0: Free stop 1: Stop as stop mode	00	○	0730H
P7-52	Brake starting voltage	200.0V ~ 2000.0V	690V	○	0734H
P7-53	Utilization rate of brake resistor	0 ~ 100%	100%	○	0735H
P7-55	Over voltage stall gain	0 ~ 100	30	○	0737H
P7-56	Over voltage stall protection voltage	650V ~ 800V	760.0V	○	0738H
P7-61	Load loss detection level	0.0%~100.0%	10.0%	○	073DH
P7-62	Load loss detection time	0.0~60.0s	1.0s	○	073EH
P7-63	Over speed detection value	0.0% ~ 50.0% (the unit is max output frequency P0-13)	20.0%	○	073FH
P7-64	Over speed detection time	0.0s~60.0s	1.0s	○	0740H
P7-65	Detection value of excessive speed deviation	0.0% ~ 50.0%(unit is max frequency P0-13)	20.0%	○	0741H
P7-66	Excessive speed deviation detection time	0.0s ~ 60.0s	5.0s	○	0742H
P7-67	Selection of instantaneous stop non-stop function	0: Transient power failure invalid 1: Deceleration in case of instantaneous power failure 2: Deceleration stop in case of instantaneous power failure	0	×	0743H
P7-68	Pause judgement voltage of transient stop action	80%~100%	85%	×	0744H
P7-69	Judgment time of instantaneous stop non-stop voltage rising	0.0s~30.0s	0.5s	×	0745H
P7-70	Judgement voltage of instantaneous stop non-stop action	60%~100% (Bus voltage)	80%	○	0746H
P7-71	Proportional gain of instantaneous stop non-stop	0 ~ 100	40	○	0747H
P7-72	Integral coefficient of instantaneous stop	0 ~ 100	30	○	0748H

Group P7: Fault parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
	non-stop				
P7-73	Deceleration time of instantaneous stop non-stop	0 ~ 300.0s	20.0	×	0749H

Group P8: Keyboard and display

Group P8: keyboard and display					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P8-00	JOG/REV function selection	0: Menu switching 1: Forward and reverse switching 2: Forward jog 3: Reverse jog	0	×	0800H
P8-01	STOP/REST function	0: Only in keyboard operation mode, STOP key shutdown function is effective 1: In any operation mode, the STOP key is effective	1	○	0801H
P8-02	Parameter initialization	0: No operation 1: Restore factory parameters, excluding motor parameters 1:Restore factory parameters, excluding motor parameters and P0-13, P0-15 (supported by version 3730 and above) 2: Clear record information 3: Restore factory parameters (including motor parameters) 4: Backup current user parameters (only supported by LCD panel) 5: Restore user backup parameters (only supported by LCD panel)	0	×	0802H
P8-03	User password	0~65535	00000	○	-
P8-05	Personalized parameter mode selection	Ones bit: 0: No display 1: Display user selected parameters Tens bit: 0: No display 1: Display user modified parameters	00	×	-
P8-06	Parameter modification attribute	0: Modifiable 1: Not modifiable	0	○	-

Group P8: keyboard and display					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P8-07	LED operation display parameter 1 (low 16-bit)	The bit meaning Bit0: Operating frequency Bit1: Set frequency Bit2: Bus voltage Bit3: Output current Bit4: Output voltage Bit5: Output torque Bit6: Output power Bit7: X input status Bit8: Y output status Bit10: AI voltage Bit14: PID setting Bit15: PID feedback Bit16: Load speed display Bit17: Feedback speed, the unit is 0.1Hz Bit18: Actual feedback speed Bit19: Line speed Bit20: PLC stage Bit23: Main frequency A display Bit24: Auxiliary frequency B display Bit25: Communication setting value Bit26: Voltage before AI correction (version 3744 and above) Bit27: Voltage before AI correction (below version 3744) Bit29: Remaining running time Bit30: Current power on time Bit31: Current running time	001F	○	0807H
P8-08	LED operation display parameter 2 (high 16-bit)		0000	○	0808H
P8-09	LED stop display parameters	The bit meaning Bit0: Set frequency Bit1: Bus voltage Bit2: X input status Bit3: Y output status Bit4: AI voltage (version 3744 and above) Bit5: AI voltage (below version 3744) Bit8: PID setting Bit9: Load speed display Bit10: PLC Step	0033	○	0809H
P8-10	Accumulated running time	0h~65535h	-	-	080AH
P8-11	Cumulative power on time	0h~65535h	-	-	080BH
P8-12	Cumulative power consumption	0~65535 degree	-	-	080CH
P8-14	Product number	-	-	-	080EH

Group P8: keyboard and display					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P8-15	Software version	-	-	-	080FH
P8-16	Function version	-	-	-	0810H
P8-19	Inverter module radiator temperature	0.0℃~100.0℃	-	-	0813H
P8-20	Output power factor	0.00% ~ 200.0%	100.0	○	0814H
P8-21	Load speed display factor	0.0001~6.5000	1.0000	○	0815H
P8-22	Number of decimal points for load speed display	Ones bit:number of decimal points of U0-16 0: 0 decimal places 1: 1 decimal place 2: 2 decimal places Tens bit:number of decimal points of U0-17 1: 1 decimal place 2: 2 decimal places	11	○	0816H

Group P9: Communication parameters

Group P9: communication parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
P9-00	Serial communication protocol selection	0: Modbus-RTU protocol 1: Extension card(EtherCAT, CANopen)	0	×	0900H
P9-01	Local Host	0: Broadcast address 1 ~ 247 (Modbus valid)	1	○	0901H
P9-02	Communication baud rate	Ones bit: MODBUS 0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS (Supported in versions 3740 and above) 9: 115200BPS (Supported in versions 3740 and above) Tens bit: EtherCAT 0：115200BPS 1：208300BPS 2：256000BPS 3：512000BPS	06	○	0902H
P9-03	MODBUS data format	0: No parity (8-N-2)	1	○	0903H

		1: Even parity (8-E-1) 2: Odd parity (8-O-1) 3: No parity (8-N-1)			
P9-04	Communication timeout	0.0: Invalid 0.1~60.0s	0.0	○	0904H
P9-05	MODBUS response delay	0~20ms (Modbus valid)	2	○	0905H
P9-06	Communication interruption detection of expansion card	0.0~60.0s	0.0s	○	0906H
P9-07	VB3/VB5/V5 communication control words (supported in versions 3740 and above)	Ten bit: 0: Disable 1: Enable	00	○	0907H

Group PA: Process control closed-loop parameters

Group PA: process control closed-loop parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
PA-01	Setting channel selection	0: PA-05 setting 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting 6: Multi-segment command setting	0	○	0A01H
PA-02	Feedback channel selection	0: AI (version 3744 and above) 1: AI (below version 3744) 6: Communication setting	0	○	0A02H
PA-03	PID feedback filter time	0.00s~30.00s	0.00s	○	0A03H
PA-04	PID output filter time	0.00s~30.00s	0.00s	○	0A04H
PA-05	PID value setting	0.0%~100.0%	50.0%	○	0A05H
PA-06	PID setting change time	0.00s~300.00s	0.00s	○	0A06H
PA-07	PID reverse cut-off frequency	0.00Hz~ max output frequency	0.00Hz	○	0A07H
PA-08	PID deviation limit	0.0%~100.0%	0.0%	○	0A08H
PA-09	PID differential limit	0.00%~100.00%	0.10%	○	0A09H
PA-10	Proportional gain P	0.0~1000.0	20.0	○	0A0AH
PA-11	Integral time I	0.01s~10.00s	2.00s	○	0A0BH
PA-12	Differential time D	0.000s~10.000s	0.000s	○	0A0CH
PA-13	PID parameter switching condition	0: Do not switch 1: Switch through X terminal 2:Switch automatically according to deviation 3:Switch automatically according to the operation frequency	0	○	0A0DH

Group PA: process control closed-loop parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
PA-14	PID parameter switching deviation 1	0.0%~PA-15	20.0%	○	0A0EH
PA-15	PID parameter switching deviation 2	PA-14~100.0%	80.0%	○	0A0FH
PA-16	PID proportional gain P2	0.0~100.0	20.0	○	0A10H
PA-17	PID integral time I2	0.01s~10.00s	2.00s	○	0A11H
PA-18	PID differential time D2	0.000s~10.000s	0.000s	○	0A12H
PA-19	PID action direction	0: Positive action 1: Negative action	0	○	0A13H
PA-20	PID given feedback range	0~65535	1000	○	0A14H
PA-21	PID maximum deviation between two outputs	0.00%~100.00%	1.00%	○	0A15H
PA-22	PID minimum deviation between two outputs	0.00%~100.00%	1.00%	○	0A16H
PA-23	PID initial value	0.0%~100.0%	0.0%	○	0A17H
PA-24	PID initial value holding time	0.00s~600.00s	0.00s	○	0A18H
PA-25	PID operation mode (whether to operate when stop)	0: Not operation when stop 1: Operation during shutdown	0	○	0A19H
PA-26	PID integral attribute	Ones bit: Integral separation 0: Invalid 1: Valid Tens bit: Whether to stop integration after output to limit value 0: Continue to integral 1: Stop integral	00	○	0A1AH
PA-27	PID feedback lost detection value	0.0%: Not judge the feedback lost 0.1%~100.0%	0.0%	○	0A1BH
PA-28	PID feedback lost detection time	0.0s~30.0s	0.0s	○	0A1CH

Group PB: Multi-speed and simple PLC operation parameters

Group PB: multi-speed and simple PLC operation parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
PB-00	Multi-segment frequency 0	-100.0%~+100.0%	0.0%	○	0B00H
PB-01	Multi-segment frequency 1	-100.0%~+100.0%	0.0%	○	0B01H
PB-02	Multi-segment frequency 2	-100.0%~+100.0%	0.0%	○	0B02H
PB-03	Multi-segment frequency 3	-100.0%~+100.0%	0.0%	○	0B03H
PB-04	Multi-segment frequency 4	-100.0%~+100.0%	0.0%	○	0B04H
PB-05	Multi-segment frequency 5	-100.0%~+100.0%	0.0%	○	0B05H

Group PB: multi-speed and simple PLC operation parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
PB-06	Multi-segment frequency 6	-100.0%~+100.0%	0.0%	○	0B06H
PB-07	Multi-segment frequency 7	-100.0%~+100.0%	0.0%	○	0B07H
PB-08	Multi-segment frequency 8	-100.0%~+100.0%	0.0%	○	0B08H
PB-09	Multi-segment frequency 9	-100.0%~+100.0%	0.0%	○	0B09H
PB-10	Multi-segment frequency 10	-100.0%~+100.0%	0.0%	○	0B0AH
PB-11	Multi-segment frequency 11	-100.0%~+100.0%	0.0%	○	0B0BH
PB-12	Multi-segment frequency 12	-100.0%~+100.0%	0.0%	○	0B0CH
PB-13	Multi-segment frequency 13	-100.0%~+100.0%	0.0%	○	0B0DH
PB-14	Multi-segment frequency 14	-100.0%~+100.0%	0.0%	○	0B0EH
PB-15	Multi-segment frequency 15	-100.0%~+100.0%	0.0%	○	0B0FH
PB-16	Multi-segment 0 command setting mode	0: PB-00 setting 1: AI (version 3744 and above) 2: AI (below version 3744) 5: PID setting 6: Preset frequency P0-10	0	○	0B10H
PB-17	Simple PLC segment 0 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B11H
PB-18	Simple PLC segment 0 acc/dec time	0~3	0	○	0B12H
PB-19	Simple PLC segment 1 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B13H
PB-20	Simple PLC segment 1 acc/dec time	0~3	0	○	0B14H
PB-21	Simple PLC segment 2 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B15H
PB-22	Simple PLC segment 2 acc/dec time	0~3	0	○	0B16H
PB-23	Simple PLC segment 3 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B17H
PB-24	Simple PLC segment 3 acc/dec time	0~3	0	○	0B18H
PB-25	Simple PLC segment 4 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B19H
PB-26	Simple PLC segment 4 acc/dec time	0~3	0	○	0B1AH
PB-27	Simple PLC segment 5 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B1BH
PB-28	Simple PLC segment 5 acc/dec time	0~3	0	○	0B1CH
PB-29	Simple PLC segment 6 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B1DH
PB-30	Simple PLC segment 6 acc/dec time	0~3	0	○	0B1EH

Group PB: multi-speed and simple PLC operation parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
PB-31	Simple PLC segment 7 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B1FH
PB-32	Simple PLC segment 7 acc/dec time	0~3	0	○	0B20H
PB-33	Simple PLC segment 8 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B21H
PB-34	Simple PLC segment 8 acc/dec time	0~3	0	○	0B22H
PB-35	Simple PLC segment 9 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B23H
PB-36	Simple PLC segment 9 acc/dec time	0~3	0	○	0B24H
PB-37	Simple PLC segment 10 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B25H
PB-38	Simple PLC segment 10 acc/dec time	0~3	0	○	0B26H
PB-39	Simple PLC segment 11 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B27H
PB-40	Simple PLC segment 11 acc/dec time	0~3	0	○	0B28H
PB-41	Simple PLC segment 12 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B29H
PB-42	Simple PLC segment 12 acc/dec time	0~3	0	○	0B2AH
PB-43	Simple PLC segment 13 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B2BH
PB-44	Simple PLC segment 13 acc/dec time	0~3	0	○	0B2CH
PB-45	Simple PLC segment 14 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B2DH
PB-46	Simple PLC segment 14 acc/dec time	0~3	0	○	0B2EH
PB-47	Simple PLC segment 15 operation time	0.0~6500.0s(h)	0.0s(h)	○	0B2FH
PB-48	Simple PLC segment 15 acc/dec time	0~3	0	○	0B30H
PB-49	Simple PLC operation mode	0:Stop at the end of single operation 1: Keep the final value at the end of single operation 2: Cycle all the time	0	○	0B31H
PB-50	Simple PLC operation time unit	0: Second 1: Hour	0	○	0B32H
PB-51	Simple PLC power-off	Ones bit: ower-off memory	00	○	0B33H

Group PB: multi-speed and simple PLC operation parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
	memory selection	0: not memory 1: memory Tens bit: shutdown memory 0: not memory 1: memory			

Group PC: Auxiliary operation parameters

Group PC: Auxiliary operation parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
PC-00	Jog frequency	0.00Hz ~ P0-13	2.00Hz	○	0C00H
PC-01	Jog acceleration time	0.0s~6500.0s	20.0s	○	0C01H
PC-02	Jog deceleration time	0.0s~6500.0s	20.0s	○	0C02H
PC-03	Acceleration time 2	0.1s~6500.0s	Model setting	○	0C03H
PC-04	Deceleration time 2	0.1s~6500.0s	Model setting	○	0C04H
PC-05	Acceleration time 3	0.1s~6500.0s	Model setting	○	0C05H
PC-06	Deceleration time 3	0.1s~6500.0s	Model setting	○	0C06H
PC-07	Acceleration time 4	0.1s~6500.0s	Model setting	○	0C07H
PC-08	Deceleration time 4	0.1s~6500.0s	Model setting	○	0C08H
PC-09	The unit of acc/dec time	0: 1s 1: 0.1s 2: 0.01s	1	×	0C09H
PC-10	The base frequency of acc/dec time	0: Max frequency 1: Setting frequency 2: 100Hz	0	×	0C0AH
PC-11	Switching frequency point between acceleration time 1 and acceleration time 2	0.00Hz~max output frequency	0.00Hz	○	0C0BH
PC-12	Switching frequency point between deceleration time 1 and deceleration time 2	0.00Hz~ max output frequency	0.00Hz	○	0C0CH
PC-13	Jump frequency 1	0.00Hz~ max output frequency	0.00Hz	○	0C0DH
PC-14	Jump frequency 2	0.00Hz~ max output frequency	0.00Hz	○	0C0EH
PC-15	Jump frequency range	0.00Hz~ max output frequency	0.00Hz	○	0C0FH
PC-16	Whether the jump frequency is effective	0: Invalid 1: Valid (in vector mode)	0	○	0C10H

Group PC: Auxiliary operation parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
	during acceleration and deceleration				
PC-17	Frequency reaching detection range	0.0%~100.0%	0.0%	○	0C11H
PC-18	Frequency detection value (FDT1 voltage level)	0.00Hz~ max output frequency	50.00Hz	○	0C12H
PC-19	Frequency detection hysteresis value (FDT1 voltage level)	0.0%~100.0% (max output frequency)	5.0%	○	0C13H
PC-20	Frequency detection value (FDT2 voltage level)	0.00Hz~ max output frequency	50.00Hz	○	0C14H
PC-21	Frequency detection hysteresis value (FDT2 voltage level)	0.0%~100.0%	5.0%	○	0C15H
PC-22	Frequency reached detection value 1	0.00Hz~ max output frequency	50.00Hz	○	0C16H
PC-23	Frequency reached detection 1 range	0.0%~100.0% (max output frequency)	0.0%	○	0C17H
PC-24	Frequency reached detection value 2	0.00Hz~ max output frequency	50.00Hz	○	0C18H
PC-25	Frequency reached detection 2 range	0.0%~100.0% (max output frequency)	0.0%	○	0C19H
PC-26	Timing function selection	0: Invalid 1: Valid	0	×	0C1AH
PC-28	Setting operation time	0.0Min~6500.0Min	0.0Min	×	0C1CH
PC-29	Present operation reached time	0.0Min~6500.0Min	0.0Min	×	0C1DH
PC-30	Setting power on reached time	0 ~ 65000h	0	×	0C1EH
PC-32	Setting operation reached time	0 ~ 65000h	0	×	0C20H
PC-34	Current reached detection value 1	0.0%~300.0% (motor rated current)	100.0%	○	0C22H
PC-35	Current reached detection 1 range	0.0%~300.0% (motor rated current)	0.0%	○	0C23H
PC-36	Current reached detection value 2	0.0%~300.0% (motor rated current)	100.0%	○	0C24H
PC-37	Current reached detection 2 range	0.0%~300.0% (motor rated current)	0.0%	○	0C25H
PC-38	Zero current detection value	0.0%~300.0% (motor rated current)	5.0%	○	0C26H
PC-39	Zero current detection delay time	0.00s~600.00s	0.10s	○	0C27H

Group PC: Auxiliary operation parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
PC-40	Software overcurrent point	0.0% (not detect) 0.1%~300.0% (motor rated current)	200.0%	○	0C28H
PC-41	Software overcurrent detection delay time	0.00s~600.00s	0.00s	○	0C1CH
PC-42	AI input voltage lower limit	0.00V~PC-43	3.10V	○	0C1DH
PC-43	AI input voltage upper limit	PC-42~10.50V	6.80V	○	0C2BH
PC-44	Overvoltage point setting	220V model: 200~400V 380V model: 540~810V	220:400V 380:810V	×	0C2CH
PC-45	Undervoltage point setting	220V model: 200~400V 380V model: 200~537V	220:200V 380:350V	×	0C2DH
PC-46	Operation action when the frequency is lower than lower limit frequency	0: Run at lower limit frequency 1: Stop 2: Run at zero speed	0	○	0C2EH
PC-47	Module temperature reached	0℃~100℃	75	○	0C2FH
PC-48	Fan control	0: The fan runs during operation 1: The fan is running all the time	0	○	0C30H
PC-49	Droop control	0.00Hz~10.00Hz	0.00Hz	○	0C31H
PC-50	Terminal jog run priority	0: Invalid 1: Valid	0	○	0C32H
PC-51	SVC optimization selection	1: Optimization mode 1 2: Optimization mode 2	2	○	0C33H
PC-52	Dead area compensation mode	0: No compensation 1: Compensation mode 1	1	○	0C34H
PC-54	Modulation mode	0: Asynchronous Modulation 1: Synchronous modulation	0	○	0C36H
PC-55	DPWM switching upper limit frequency	5.00Hz~max output frequency	8.00Hz	○	0C37H
PC-56	Random PWM depth	0: Random PWM invalid 1~10: PWM carrier frequency random depth	0	○	0C38H
PC-57	Wake up frequency	Dormancy frequency PC-59~max output frequency P0-13	0.00Hz	○	0C39H
PC-58	Wake up delay time	0.0s~6500.0s	0.0s	○	0C3AH
PC-59	Dormancy frequency	0.00Hz~wake up frequency PC-57	0.00Hz	○	0C3BH
PC-60	Dormancy delay time	0.0s~6500.0s	0.0s	○	0C3CH
PC-61	Wave by wave current limiting enable	0: Not enable 1: Enable	1	○	0C3DH
PC-62	Current detection compensation	0~100	000	○	0C3EH
PC-65	Bus voltage reached value	Unit : 0.1V	500.0	○	0C41H
PC-66	The bus voltage reached hysteresis value	Unit : 0.1V	50.0	○	0C42H
PC-67	Carrier frequency	0.5K~16.0K	Model	○	0C43H

Group PC: Auxiliary operation parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
			setting		
PC-68	Carrier frequency is adjusted with temperature	0: Invalid 1: Valid	1	○	0C44H
PC-69	VFD temperature protection alarm threshold	Reserved	-	-	0C45H
PC-72	External linear speed given source (supported by 3720 and above)	0:Do not use external linear speed 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication	0	○	0C48H
PC-73	Maximum allowable update deviation of main frequency (supported by 3720 and above)	0.00%～10.00%	0.10%	○	0C49H
PC-74	Allowed update interval of main frequency (supported by 3720 and above)	0.00s~200.00s	3.00s	○	0C4AH
PC-75	Differential time of external linear speed change (supported by 3720 and above)	0.00s~50.00s	1.00s	○	0C4BH
PC-76	External linear speed change (supported by 3720 and above)	0.00Hz~50.00Hz	1.00Hz	○	0C4CH

Group PE: User optional parameters

Group PE: user optional parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
PE-00	User optional parameters 0	P0.00 ~ PF.xx A0.00 ~ A2.xx A9.00 ~ Ad.xx U0.00 ~ U0.xx U4.00 ~ U5.xx	U4-00	○	0E00H
PE-01	User optional parameters 1	Same to PE-00	U4-01	○	0E01H
PE-02	User optional parameters 2	Same to PE-00	U4-08	○	0E02H
PE-03	User optional parameters 3	Same to PE-00	U4-09	○	0E03H
PE-04	User optional parameters 4	Same to PE-00	U4-10	○	0E04H
PE-05	User optional parameters 5	Same to PE-00	U4-03	○	0E05H
PE-06	User optional parameters 6	Same to PE-00	U4-06	○	0E06H
PE-07	User optional parameters 7	Same to PE-00	P0-00	○	0E07H
PE-08	User optional parameters 8	Same to PE-00	P0-00	○	0E08H
PE-09	User optional parameters 9	Same to PE-00	P0-00	○	0E09H

Group PE: user optional parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
PE-10	User optional parameters 10	Same to PE-00	P0-00	○	0E0AH
PE-11	User optional parameters 11	Same to PE-00	P0-00	○	0E0BH
PE-12	User optional parameters 12	Same to PE-00	P0-00	○	0E0CH
PE-13	User optional parameters 13	Same to PE-00	P0-00	○	0E0DH
PE-14	User optional parameters 14	Same to PE-00	P0-00	○	0E0EH
PE-15	User optional parameters 15	Same to PE-00	P0-00	○	0E0FH
PE-16	User optional parameters 16	Same to PE-00	P0-00	○	0E10H
PE-17	User optional parameters 17	Same to PE-00	P0-00	○	0E11H
PE-18	User optional parameters 18	Same to PE-00	P0-00	○	0E12H
PE-19	User optional parameters 19	Same to PE-00	P0-00	○	0E13H
PE-20	User optional parameters 20	Same to PE-00	U0-67	○	0E14H
PE-21	User optional parameters 21	Same to PE-00	U0-68	○	0E15H
PE-22	User optional parameters 22	Same to PE-00	U0-69	○	0E16H
PE-23	User optional parameters 23	Same to PE-00	U0-70	○	0E17H
PE-24	User optional parameters 24	Same to PE-00	U0-74	○	0E18H
PE-25	User optional parameters 25	Same to PE-00	U0-00	○	0E19H
PE-26	User optional parameters 26	Same to PE-00	U0-55	○	0E1AH
PE-27	User optional parameters 27	Same to PE-00	U0-56	○	0E1BH
PE-28	User optional parameters 28	Same to PE-00	P0-00	○	0E1CH
PE-29	User optional parameters 29	Same to PE-00	P0-00	○	0E1DH
PE-30	User optional parameters 30	Same to PE-00	P0-00	○	0E1EH
PE-31	User optional parameters 31	Same to PE-00	P0-00	○	0E1FH

Group PF: Torque control (Firmware versions below 3720)

Group PF: Torque control					
Parameter	Name	Setting range	Default value	Modify	Modbus address
PF-00	Torque control	0: Speed control 1: Torque control	0	×	0F00H
PF-01	Upper limit source of driver torque	0: Digital setting 2: AI 5: Communication setting (the full scale of option 1~7 correspond to PF-02 digital setting)	0	×	0F01H
PF-02	Driver torque upper limit	-200.0%~200.0%	150.0%	○	0F02H
PF-03	Torque control forward direction max frequency	0.00Hz~max output frequency	50.00Hz	○	0F03H
PF-04	Torque control reverse direction max frequency	0.00Hz~ max output frequency	50.00Hz	○	0F04H
PF-05	Torque acceleration time	0.00s~650.00s	0.00s	○	0F05H
PF-06	Torque deceleration time	0.00s~650.00s	0.00s	○	0F06H

Group PF: Torque control (Firmware versions 3720 and above)

Group PF: Torque control					
Parameter	Name	Setting range	Default value	Modify	Modbus address
PF-00	Torque control	0: Speed control 1: Torque control	0	×	0F00H
PF-01	Upper limit source of driver torque	0: Digital setting 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting (the full scale of option 0, 1, 2, 5 correspond to PF-02 digital setting)	0	×	0F01H
PF-02	Driver torque upper limit	-200.0%~200.0%	150.0%	○	0F02H
PF-03	Torque control forward maximum frequency source	0: Digital setting 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting (the full scale of option 0, 1, 2, 5 correspond to PF-02 digital setting)	0	○	0F03H
PF-04	Torque control forward maximum frequency	0.00Hz~max output frequency	50.00Hz	○	0F04H
PF-05	Torque control reverse maximum frequency source	0: Digital setting 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting (the full scale of option 0, 1, 2, 5 correspond to PF-02 digital setting)	0	○	0F05H
PF-06	Torque control reverse maximum frequency	0.00Hz~max output frequency	50.00Hz	○	0F06H
PF-07	Torque acceleration time	0.00s～650.00s	0.00s	○	0F07H
PF-08	Torque deceleration time	0.00s～650.00s	0.00s	○	0F08H

Group A0: Textile

Group A0: textile					
Parameter	Name	Setting range	Default value	Modify	Modbus address
A0-00	Setting length	0m~65535m	1000m	○	A000H
A0-01	Actual length	0m~65535m	0m	○	A001H
A0-02	Pulse number per meter	0.1~6553.5	100.0	○	A002H
A0-03	Set count value	1~65535	1000	○	A003H
A0-04	Specify count value	1~65535	1000	○	A004H
A0-05	Swing frequency setting mode	0: relative to center frequency 1: relative to the maximum frequency	0	○	A005H
A0-06	Swing frequency range	0.0%~100.0%	0.0%	○	A006H
A0-07	Jump frequency amplitude	0.0%~50.0%	0.0%	○	A007H
A0-08	Swing frequency period	0.1s~3600.0s	10.0s	○	A008H
A0-09	Triangular wave rise time of swing frequency	0.1%~100.0%	50.0%	○	A009H

Group A1: Virtual IO

Group A1: Virtual IO					
Parameter	Name	Setting range	Default value	Modify	Modbus address
A1-00	Function selection of virtual X1 terminal	0~51: Refer to group P2 physical X input selection	00	×	A100H
A1-01	Function selection of virtual X2 terminal		00	×	A101H
A1-02	Function selection of virtual X3 terminal		00	×	A102H
A1-03	Function selection of virtual X4 terminal		00	×	A103H
A1-04	Function selection of virtual X5 terminal		00	×	A104H
A1-05	Virtual X terminal effective state source	0: the state of virtual Y1 determines whether virtual X1 is valid 1: Function code A1-06 sets whether virtual X1 is valid Ones bit: virtual X1 Tens bit: virtual X2 Hundreds bit: virtual X3 Thousands bit: virtual X4 Ten thousands bit: virtual X5	00000	×	A105H
A1-06	Virtual X terminal status setting	0: Invalid 1: Valid Tens bit: virtual X1 Tens bit: virtual X2 Hundreds bit: virtual X3 Thousands bit: virtual X4 Ten thousands bit: virtual X5	00000	×	A106H
A1-07	Function selection of AI terminal as X terminal (version 3744 and above)	0~51	00	×	A107H
A1-08	Function selection of AI terminal as X terminal (below version 3744)	0~51	00	×	A108H
A1-10	Selection of effective voltage level when AI is used as X terminal	Ones bit: AI (version 3744 and above) 0: Low level valid 1: High level valid Ten bit: AI (below version 3744)	000	×	A10AH
A1-11	Virtual Y1 output function selection	0: Connect with physical X1 inside 1~42: Refer to group P3 physical Y output selection	00		A10BH
A1-12	Virtual Y2 output function selection	0: Connect with physical X2 inside 1~42: Refer to group P3 physical Y output	00	○	A10CH

Group A1: Virtual IO					
Parameter	Name	Setting range	Default value	Modify	Modbus address
		selection			
A1-13	Virtual Y3 output function selection	0: Connect with physical X3 inside 1~42: Refer to group P3 physical Y output selection	00	○	A10DH
A1-14	Virtual Y4 output function selection	0: Connect with physical X4 inside 1~42: Refer to group P3 physical Y output selection	00	○	A10EH
A1-15	Virtual Y5 output function selection	0: Connect with physical X5 inside 1~42: Refer to group P3 physical Y output selection	00	○	A10FH
A1-16	Virtual Y1 output delay time	0.0s ~ 3600.0s	0.0s	○	A110H
A1-17	Virtual Y2 output delay time	0.0s ~ 3600.0s	0.0s	○	A111H
A1-18	Virtual Y3 output delay time	0.0s ~ 3600.0s	0.0s	○	A112H
A1-19	Virtual Y4 output delay time	0.0s ~ 3600.0s	0.0s	○	A113H
A1-20	Virtual Y5 output delay time	0.0s ~ 3600.0s	0.0s	○	A114H
A1-21	Virtual Y terminal effective state selection	Ones bit: virtual Y1 0: Positive logic 1: Negative logic Tens bit: virtual Y2 Hundreds bit: virtual Y3 Thousands bit: virtual Y4 Ten thousands bit: virtual Y5	00000	○	A115H

Group A2: Second motor parameters

Group A2: second motor parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
A2-00	Motor type selection	0: Common asynchronous motor	0	×	A200H
A2-01	Motor rated power	0.1KW~650.0KW	Model setting	×	A201H
A2-02	Motor rated voltage	1V~1200V	Model setting	×	A202H
A2-03	Motor rated current	0.01A~655.35A (VFD power ≤55KW) 0.1A~6553.5A (VFD power >55KW)	Model setting	×	A203H
A2-04	Motor rated frequency	0.01Hz~max output frequency	Model setting	×	A204H
A2-05	Motor rated speed	1rpm~65535rpm	Model	×	A205H

Group A2: second motor parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
			setting		
A2-06	Asynchronous motor stator resistance	0.001Ω~65.535Ω (VFD power ≤55kW) 0.0001Ω~6.5535Ω (VFD power >55kW)	Tuning parameters	×	A206H
A2-07	Asynchronous motor rotor resistance	0.001Ω~65.535Ω (VFD power ≤55kW) 0.0001Ω~6.5535Ω (VFD power >55kW)	Tuning parameters	×	A207H
A2-08	Asynchronous motor leakage inductance	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)	Tuning parameters	×	A208H
A2-09	Asynchronous motor mutual inductance	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)	Tuning parameters	×	A209H
A2-10	Asynchronous motor current without load	0.01A~A2-03 (VFD power ≤55kW) 0.1A~A2-03 (VFD power >55kW)	Tuning parameters	×	A20AH
A2-15	Synchronous motor stator resistance	0.001Ω~65.535Ω (VFD power ≤55kW) 0.0001Ω~6.5535Ω (VFD power >55kW)	Tuning parameters	×	A20FH
A2-16	Synchronous motor D-axis inductance	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)	Tuning parameters	×	A210H
A2-17	Synchronous motor Q-axis inductance	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)	Tuning parameters	×	A211H
A2-19	Synchronous motor back electromotive force coefficient	0~6000.0	Tuning parameters	×	A213H
A2-35	Motor 2 parameter self-learning	0: No operation 1: Static tuning 1 2: Dynamic tuning 3: Static tuning 2	0	×	A223H
A2-36	Motor 2 control mode	0: VF control 1: No speed sensor vector control (SVC)	0	×	A224H
A2-37	Motor 2 acc/dec time selection	0: Same to first motor 1: Acceleration and deceleration time 1 2: Acceleration and deceleration time 2 3: Acceleration and deceleration time 3 4: Acceleration and deceleration time 4	0	○	A225H
A2-38	Motor 2 torque boost	0.0%: Automatic torque boost 0.1%~30.0%	Model setting	○	A226H
A2-40	Motor 2 oscillation suppression gain	0~100	Model setting	○	A228H
A2-41	Speed loop proportion gain 1	1~100	30	○	A229H
A2-42	Speed loop integral time 1	0.01s~10.00s	0.50	○	A22AH
A2-43	Speed loop proportion gain 2	1~100	20	○	A22BH
A2-44	Speed loop integral time 2	0.01s~10.00s	1.00	○	A22CH
A2-45	Switching frequency 1	0.00~A2-46	5.00	○	A22DH
A2-46	Switching frequency 2	A2-45~max output frequency (P0-13)	10.00	○	A22EH

Group A2: second motor parameters					
Parameter	Name	Setting range	Default value	Modify	Modbus address
A2-47	Speed loop integral property	Ones bit: Integral separation 0: Invalid 1: Valid	0	○	A22FH
A2-48	Slip gain of vector control	50%~200%	100%	○	A230H
A2-49	SVC speed feedback filter time	0.000s~0.100s	0.015s	○	A231H
A2-51	Torque upper limit source under speed control mode	0: Parameter setting (A2-52) 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting Full scale of option 0, 1, 2, 5 corresponding to A2-53 digital setting	0	○	A233H
A2-52	Digital setting of torque upper limit in speed control mode	0.0%~200.0%	150.0%	○	A234H
A2-55	Proportional gain of excitation regulation	0 ~ 60000	2000	○	A237H
A2-56	Integral gain of excitation regulation	0 ~ 60000	1300	○	A238H
A2-57	Torque regulation proportional gain	0 ~ 60000	2000	○	A239H
A2-58	Integral gain of torque regulation	0 ~ 60000	1300	○	A23AH

Group A4: Password countdown lock (supported by 3720 and above versions)

Group A4: Password countdown lock				
Parameter	Name	Setting range	Default value	Modify
A4-00	Parameter group access verification	0～65000	0	○
A4-01	Parameter group lock password	0～65000	0	○
A4-02	Total power on time before locking	0～7200	0h	○
A4-03	Remaining time of power on locking	0～7200	0h	○

Group A9: Communication address mapping (supported by 3720 and above versions)

Group A9: Communication address mapping					
Parameter	Name	Setting range	Default value	Modify	Modbus address
A9-00	Communication address mapping selection	0: Communication mapping function does not take effect 1: Communication mapping function	0	○	A900H

Group A9: Communication address mapping					
Parameter	Name	Setting range	Default value	Modify	Modbus address
		takes effect			
A9-01	Communication address mapping primitive 1	0x0000~0xFFFF	0x0000	○	A901H
A9-02	Communication address mapping primitive 2	0x0000~0xFFFF	0x0000	○	A902H
A9-03	Communication address mapping primitive 3	0x0000~0xFFFF	0x0000	○	A903H
A9-04	Communication address mapping primitive 4	0x0000~0xFFFF	0x0000	○	A904H
A9-05	Communication address mapping primitive 5	0x0000~0xFFFF	0x0000	○	A905H
A9-06	Communication address mapping primitive 6	0x0000~0xFFFF	0x0000	○	A906H
A9-07	Communication address mapping primitive 7	0x0000~0xFFFF	0x0000	○	A907H
A9-08	Communication address mapping primitive 8	0x0000~0xFFFF	0x0000	○	A908H
A9-09	Communication address mapping primitive 9	0x0000~0xFFFF	0x0000	○	A909H
A9-10	Communication address mapping primitive 10	0x0000~0xFFFF	0x0000	○	A90AH
A9-11	Communication address mapping primitive 11	0x0000~0xFFFF	0x0000	○	A90BH
A9-12	Communication address mapping primitive 12	0x0000~0xFFFF	0x0000	○	A90CH
A9-13	Communication address mapping primitive 13	0x0000~0xFFFF	0x0000	○	A90DH
A9-14	Communication address mapping primitive 14	0x0000~0xFFFF	0x0000	○	A90EH
A9-15	Communication address mapping image 1	0x0000~0xFFFF	0x0000	○	A90FH
A9-16	Communication address mapping image 2	0x0000~0xFFFF	0x0000	○	A910H
A9-17	Communication address mapping image 3	0x0000~0xFFFF	0x0000	○	A911H
A9-18	Communication address mapping image 4	0x0000~0xFFFF	0x0000	○	A912H
A9-19	Communication address mapping image 5	0x0000~0xFFFF	0x0000	○	A913H
A9-20	Communication address mapping image 6	0x0000~0xFFFF	0x0000	○	A914H
A9-21	Communication address mapping image 7	0x0000~0xFFFF	0x0000	○	A915H

Group A9: Communication address mapping					
Parameter	Name	Setting range	Default value	Modify	Modbus address
A9-22	Communication address mapping image 8	0x0000~0xFFFF	0x0000	○	A916H
A9-23	Communication address mapping image 9	0x0000~0xFFFF	0x0000	○	A917H
A9-24	Communication address mapping image 10	0x0000~0xFFFF	0x0000	○	A918H
A9-25	Communication address mapping image 11	0x0000~0xFFFF	0x0000	○	A919H
A9-26	Communication address mapping image 12	0x0000~0xFFFF	0x0000	○	A91AH
A9-27	Communication address mapping image 13	0x0000~0xFFFF	0x0000	○	A91BH
A9-28	Communication address mapping image 14	0x0000~0xFFFF	0x0000	○	A91CH

Group AD: AIAO correction

Group AD: AIAO correction					
Parameter	Name	Setting range	Default value	Modify	Modbus address
AD-00	AI measured voltage 1 (version 3744 and above)				
AD-01	AI display voltage 1 (version 3744 and above)				
AD-02	AI measured voltage 2 (version 3744 and above)				
AD-03	AI display voltage 2 (version 3744 and above)				
AD-04	AI measured voltage 1 (below version 3744)	0.500V~4.000V	Factory calibration	○	AD04H
AD-05	AI display voltage 1 (below version 3744)	0.500V~4.000V	Factory calibration	○	AD05H
AD-06	AI measured voltage 2 (below version 3744)	6.000V~9.999V	Factory calibration	○	AD06H
AD-07	AI display voltage 2 (below version 3744)	6.000V~9.999V	Factory calibration	○	AD07H
AD-12	AO1 target voltage 1	0.500V~4.000V	Factory calibration	○	AD08H
AD-13	AO1 measured voltage 1	0.500V~4.000V	Factory calibration	○	AD09H
AD-14	AO1 target voltage 2	6.000V~9.999V	Factory calibration	○	AD0AH
AD-15	AO1 measured voltage 2	6.000V~9.999V	Factory calibration	○	AD0BH

Group U0: Monitor parameters

Group U0:Monitor parameters				
Parameter	Name	Min unit	Display range	Modbus address
U0-00	Operation frequency (Hz)	0.01Hz	0.00~600.00Hz	7000H
U0-01	Setting frequency (Hz)	0.01Hz	0.00~600.00Hz	7001H
U0-02	Bus voltage (V)	0.1V	0.0-1024.0	7002H
U0-03	Output current (A)	0.01A	0.0~655.35A	7003H
U0-04	Output voltage (V)	1V	0V~1140V	7004H
U0-05	Output torque (%) Percentage output value of motor rated torque	0.1%	-200.0%~200.0%	7005H
U0-06	Output power (KW)	0.1KW	0-32767	7006H
U0-07	X input state	1	0x0000~0x7FFF	7007H
U0-08	Y output state	1	0x0000~0x03FF	7008H
U0-09	AI voltage (V)/current (mA) (version 3744 and above)	0.01V/0.01mA	0.00V ~10.57V /0.00mA~20.00mA	7009H
U0-10	AI voltage (V)/current (mA) (below version 3744)	0.01V/0.01mA	0.00V ~10.57V /0.00mA~20.00mA	700AH
U0-14	PID setting	1	0~65535	700EH
U0-15	PID feedback	1	0~65535	700FH
U0-16	Load speed display	Depend on P8-22	0~65535	7010H
U0-17	Feedback speed (Hz)	Depend on P8-22	-600.00Hz~600.00Hz	7011H
U0-20	PLC stage	1	0~15	7014H
U0-21	Count value	1	0~65535	7015H
U0-22	Length value	1	0~65535	7016H
U0-23	Main frequency A display	0.01Hz	0.01~ max output frequency Hz	7017H
U0-24	Auxiliary frequency B display	0.01Hz	0.01~ max output frequency Hz	7018H
U0-25	Communication setting	0.01%	-100.00%~100.00%	7019H
U0-26	AI voltage before calibration (V)/current (mA) (version 3744 and above)	0.001V/0.001mA	0.000V~10.570V 0.000mA~20.000mA	701AH
U0-27	AI voltage before calibration (V)/current (mA) (below version 3744)	0.001V/0.001mA	0.000V~10.570V 0.000mA~20.000mA	701BH
U0-29	Remaining running time	0.1Min	0.0~6500.0min	701DH
U0-30	Present power on time	1Min	0~65000min	701EH
U0-31	Present operation time	0.1Min	0.0~6500.0min	701FH
U0-33	Present fault	1	1~56	7021H
U0-34	Fault information	1	-	7022H
U0-35	Target torque (%)	0.1%	-200.0%~200.0%	7023H
U0-36	Torque upper limit	0.01%	-200.00%~200.00%	7024H
U0-41	Power factor angle	0.1°	-	7029H
U0-42	Setting frequency (%)	0.01%	-100.00%~100.00%	702AH

Group U0:Monitor parameters				
Parameter	Name	Min unit	Display range	Modbus address
U0-43	Operation frequency (%)	0.01%	-100.00%~100.00%	702BH
U0-44	VF separate target voltage	1V	0V~ Rated voltage of motor	702CH
U0-45	VF separate output voltage	1V	0V~Rated voltage of motor	702DH
U0-47	Motor serial number	0: Motor 1 1: Motor 2	-	702FH
U0-48	Check any memory address value	1	-	7030H
U0-65	Cumulative operation time of inverter (**supported by 3720 and above versions**)	1s	0~3600s	7041H
U0-66	Motor speed (**supported by 3720 and above versions**)	1RPM	0~rated speed	7042H
U0-67	Communication expansion card model	-	-	7043H
U0-68	Communication expansion card version	-	-	7044H
U0-69	Communication expansion card feedback VFD state	Bit0: 0: Shutdown 1: In operation	0x0000~0xFFFF	7045H
		Bit1: Operation direction 0: Forward 1: Reverse		
		Bit2: Fault 0: No fault 1: Faulty		
		Bit3:Frequency reaches the set frequency (supported by 3720 and above versions)		
		Bit8~Bit15:Alarm code(supported by 3720 and above versions)		
U0-70	Communication feedback motor speed /0.01Hz	0.1Hz	-	7046H
U0-71	Communication feedback motor speed /RPM	1RPM	0~motor rated speed	7047H
U0-72	Special current display for communication card	-	-	7048H
U0-73	Communication card error status	-	-	7049H
U0-74	Motor actual output torque	0.01%	-200.00% ~ 200.00%	704AH
U0-75	Fault code	0	1~56	704BH
		Bit0: 0: Shutdown		

Group U0:Monitor parameters				
Parameter	Name	Min unit	Display range	Modbus address
U0-76	Operation status word	1: In operation Bit1:Normal operation Bit2: Jog operation Bit3:Tuning operation Bit4:Jog during operation Bit5~Bit6: Running state 0: Constant speed process 1: Acceleration process 2: Deceleration process Bit7:PLC operation Bit8:PID operation Bit9:Torque control Bit10:Set frequency direction Bit11:Current frequency operation direction Bit12:Running reverse flag 0:Positive direction 1:Negative direction Bit13:Final frequency setting reverse 0:Positive direction 1:Negative direction Bit14~15:Reserved	0x0000~0xFFFF	704CH

Group U4: Communication monitoring parameters

Group U4:Communication monitoring parameters			
Parameters	Name	Min unit	
U4-00	Speed command(Communication frequency setting value)	Unit: 0.01%	
U4-01	Communication control command word	Bit0~Bit7	1: Forward running 2: Reverse operation 3: Forward jog 4: Reverse jog 5: Deceleration stop 6: Free stop 7: Fault reset
		Bit8~Bit15	Fault code sent by expansion card fault

Group U4:Communication monitoring parameters		
Parameters	Name	Min unit
U4-02	Communication control DO	-
U4-03	Communication control FMP	-
U4-04	Communication control AO1	-
U4-05	Communication control AO2	-
U4-06	Torque command(Communication torque setting value)	Unit: 0.01%
U4-07	Speed command(Communication frequency setting value)	Unit: 1RPM
U4-08	Communication expansion card model	-
U4-09	Communication expansion card version	-
U4-10	Expansion card error status	-

4-2. Parameter explanation

4-2-1. Group P0 Basic operation parameter

Parameter	Name	Setting range	
P0-01	First motor control mode selection	0	VF control
		1	No speed sensor vector control (SVC)

0: VF control

VF control is suitable for low-speed occasions where the control accuracy is not high, and can also be used for occasions where one inverter drives multiple motors. It is recommended to set P1-00 ~ P1-05 in VF control.

1: No speed sensor vector control (SVC)

It refers to the open-loop vector control, which can be applied to high-performance general occasions without pulse encoder, occasions requiring low-frequency large torque and high speed control accuracy, such as machine tools, centrifuges, wire drawing machines, injection molding machines, etc.

For vector control of inverter, only one motor can be driven by one inverter, so accurate parameters of controlled motor must be obtained for self tuning. See P1-35 for specific tuning method.

Parameter	Name	Range	
P0-02	Operation command channel selection	0	Operate panel
		1	Terminal
		2	Communication port

0: Operate panel

Controlled by the key on the operate panel.

1: Terminal

Controlled by multi-function terminals.

2: Communication port

Controlled by upper PC via communication.

Parameter	Name	Setting	Choose setting channel
P0-03	Main frequency A input channel selection	0	Digital setting (Power-off no memory)
		1	Digital setting (Power-off memory)
		2	AI (version 3744 and above)
		3	AI (below version 3744)
		6	Communication setting

		7	Multi-segment command setting
		8	PID setting
		9	Simple PLC operation
		10	Specific mode for wire drawing and winding
		11	Panel knob setting

0: Digital setting (Power-off no memory)

Set frequency in P0-10, and adjust by keyboard increase and decrease key (or up/down terminal), after power off and power on, the frequency will return to the value of P0-10.

1: Digital setting (Power-off memory)

After setting the frequency in P0-10, press increase, decrease key through the keyboard, or after up/down adjustment, the frequency of the inverter will return to the adjusted value after power down. This parameter setting is only used for power down, not for shutdown. The shutdown frequency memory setting can be modified in parameter P0-12.

2: AI (version 3744 and above)

Support 0V~10V voltage input. The correspondence between the input voltage value of AI and the target frequency is curve 1, with corresponding parameters set between P2-18 and P2-21. When AI is set by frequency, the voltage/current input corresponds to 100.0% of setting, which is the percentage relative to the maximum output frequency P0-13. (Analog quantity settings for versions 3744 and above are adjusted to this port)

3: AI (below version 3744)

Support 0V ~ 10V voltage input. The corresponding relationship between the input voltage value of AI and the target frequency is curve 2, and the corresponding parameters are set at P2-22~P2-25. When AI is set by the frequency, voltage/current input corresponds to 100% of the setting, which refers to the percentage relative to the maximum output frequency P0-13.

6: Communication setting

Set to Modbus-RTU communication, modify frequency through RS485 communication, address H1000. Write 5000 to the address, which means 50.00% of the maximum frequency P0-13. If the maximum frequency P0-13 is 50 Hz, then the frequency is 25 Hz. Communication parameters can be set in group P9. The Modbus address can be found in Appendix B-3-3 Communication protocol parameter address.

7: Multi-segment command setting

When setting it as a multi-segment command, set the X terminal function to 12~15. The non-zero combination of input terminals correspond to different frequencies and acceleration and deceleration time, up to 16 frequency segments can be set.

8: PID setting

Generally used in the field of closed-loop control, such as constant pressure closed-loop control, constant tension closed-loop control and other occasions. Closed loop control parameters can be set in group PA. VH5 has two groups of PID parameters to switch.

9: Simple PLC operation

When the frequency source is simple PLC, the inverter operates according to the specified frequency, specified

time and specified acceleration and deceleration time. The specific parameters can be set through group PB, and can run for up to 16 sections.

10: Specific mode for wire drawing and winding (supported by firmware 3720 and above versions)

PC-72~PC-76 and group PA parameters shall be set for relevant parameters.

11:LED Panel knob setting (supported by LED panel with knob, 3730 and above versions)

This function should be used with LED panel VH6-PE200. If you want to use the panel knob to adjust the target frequency, you need to set P0-03 = 11.

***Note: Only external installation is supported, but not on the inverter body.**

Parameter	Name	Range
P0-04	Auxiliary frequency B input channel selection	0~11
P0-05	Frequency source superposition selection	Ones bit: frequency source selection 0: main frequency source A 1: Operation results of main and auxiliary frequency sources (determined by tens bits) 2: Switching between main frequency A and auxiliary frequency B
		Tens bit: Operation relationship of main and auxiliary frequency sources 0: A+B 1: A-B 2: max(A,B) 3: min(A,B)

The using method of auxiliary frequency channel is similar to the main frequency input channel P0-03.

Note: when the frequency source superposition is selected (P0-05 ones bit is 1), that is, when the VFD frequency is set by superposition of main and auxiliary frequency:

(1) The auxiliary frequency input channel is digital setting (P0-04 = 0 or 1), and the preset frequency (P0-10) does not work any more. The frequency adjustment made by the user through keyboard keys (or up and down of X terminal) is directly based on the main frequency.

(2) The auxiliary frequency input channel is analog or pulse setting (P0-04 = 3). 100% of the input setting corresponds to the range of auxiliary frequency source B, which is set through P0-06 and P0-07.

(3) The main and auxiliary frequency sources cannot be set to the same channel, otherwise it is easy to cause confusion.

Parameter	Name	Range
P0-06	Auxiliary frequency source B range selection	0: Relative to the maximum frequency 1: Relative to the main frequency source A
P0-07	Auxiliary frequency source B range	0%~150%

When the frequency source is selected as "frequency superposition" (P0-05 ones bit is 1), these two parameters are used to determine the adjustment range of the auxiliary frequency source.

P0-06 is used to determine the object corresponding to the range of the auxiliary frequency source. It can be selected as relative to the maximum frequency or relative to the main frequency source A. If it is selected as relative to the main frequency source, the range of the auxiliary frequency source will change with the change of the main frequency source A.

Parameter	Name	Range
P0-09	Digital setting of auxiliary frequency source offset when superposition	0.00Hz~max output frequency (P0-13)

This parameter is only valid when the frequency source is selected as the main and auxiliary operation (P0-05 ones bit is 1).

When the frequency source is used as the main and auxiliary operation, P0-09 is used as the bias frequency, and the superposition of the main and auxiliary operation results is used as the final frequency setting value, which makes the frequency setting more flexible

Parameter	Name	Range
P0-10	Preset frequency	0.00Hz~max output frequency (P0-13)

When the frequency input channel is set to digital setting, the parameter value is the initial value of frequency digital setting.

Parameter	Name	Range	
P0-12	Frequency shutdown memory selection for digital setting	0	No memory
		1	memory

Memory and no memory refers to the frequency adjustment by keyboard ▲ and key (or up and down of X terminal) during operation, and whether the changed frequency is memorized during shutdown. When no memory is selected, the frequency will return to the set value of P0-10 (preset frequency) after shutdown.

Note: When memory is selected, it is only applicable to normal shutdown. If power is cut off suddenly during operation, the frequency will not be memorized after power is turned on again.

Parameter	Name	Range
P0-13	Max output frequency	50.00Hz~600.00Hz

Used to set the maximum output frequency of inverter.

Parameter	Name	Range	
P0-14	Upper limit frequency source	0	Set by P0-15
		1	AI (version 3744 and above)
		2	AI (below version 3744)
		5	Communication setting

The default upper limit frequency is set by P0-15. It can also be set by analog quantity (AI), and communication. When the operating frequency reaches the upper limit frequency, the upper limit frequency will be maintained. Set the upper limit through analog quantity and pulse, please refer to P2-18~P2-45.

parameter	Name	Range
P0-15	Upper limit frequency	Lower limit frequency P0-17~ max output frequency P0-13

Set the upper limit frequency, the setting range is from lower limit frequency P0-17 to max output frequency P0-13.

Parameter	Name	Range
P0-16	Upper limit frequency offset	0.00Hz~max output frequency (P0-13)

When the upper limit frequency source P0-14 is set to analog or pulse setting, P0-16 is used as the offset of the set value, the offset frequency is added with the upper limit frequency value set by P0-14 to get the set value of the final upper limit frequency.

Parameter	Name	Range
P0-17	Lower limit frequency	0.00Hz~upper limit frequency (P0-15)

Set the lower limit frequency. The range is from 0.00Hz to upper limit frequency (P0-15).

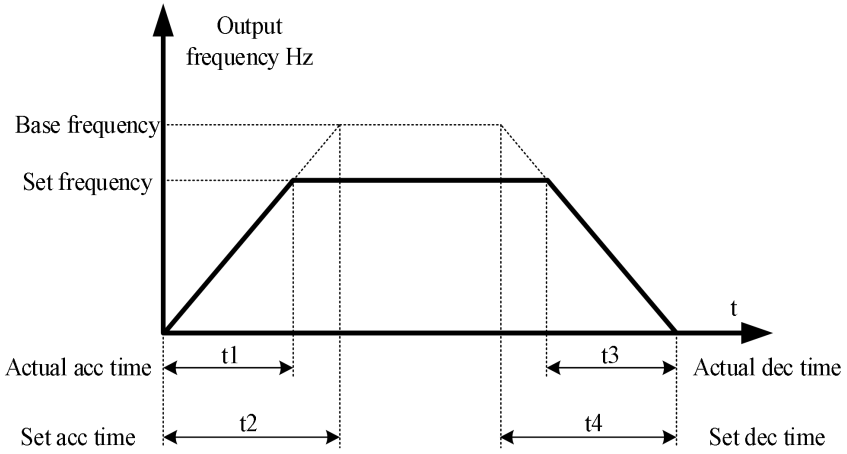
Parameter	Name	Range
P0-18	Acceleration time 1	0 ~ 65000 (PC-09=0) 0.0 ~ 6500.0 (PC-09=1) 0.00 ~ 650.00 (PC-09=2)
P0-19	Deceleration time 1	0 ~ 65000 (PC-09=0) 0.0 ~ 6500.0 (PC-09=1) 0.00 ~ 650.00 (PC-09=2)

Acceleration time refers to the time required for the inverter to accelerate from 0Hz to the acceleration/deceleration base frequency (PC-10).

Similarly, deceleration time refers to the time required for the inverter to decelerate from the acceleration/deceleration base frequency to 0Hz.

As shown in the figure, t1 and t3 are the actual acceleration and deceleration time, t2 and t4 are the set acceleration and deceleration time.

VH5 provides 4 groups of acceleration and deceleration time, the other three kinds of acceleration and deceleration time (PC-03 ~ PC-08) are the same.



Parameter	Name	Range	
P0-20	Ones place: Operation direction	0	Default operation direction
		1	Runs in the opposite direction from the default
	Tens place: Disable reverse operation (supported by 3720 and	0	Invalid

	above versions)	1	Valid (supported by 3720 and above versions)

By changing the function code, the motor direction can be changed without changing the motor wiring, which is equivalent to changing the phase sequence of any two phases in the motor (U, V, W) to realize the conversion of motor rotation direction.

Note: after parameter initialization, the motor running direction will return to the original state. It is strictly forbidden to change the direction of the motor when the system is debugged.

Parameter	Name	Range	
P0-21	Reverse frequency Prohibition (supported by 3720 and above versions)	0	Invalid
		1	Valid

When the motor is not allowed to run in the reverse direction, the parameter should be set to 1.

If P0-21=0 (negative frequency prohibition is invalid), the operation frequency of the communication given inverter is negative or the external given reverse operation command, and the inverter operates in reverse.

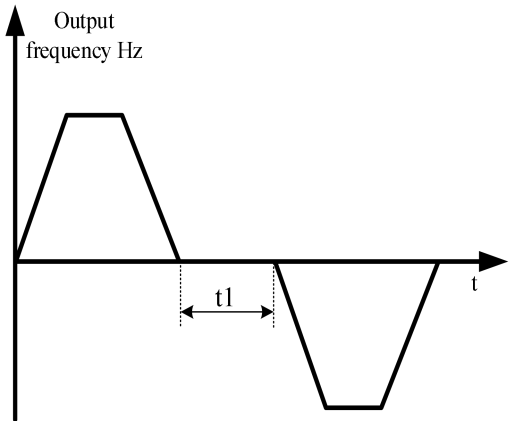
If P0-21=1 (negative frequency prohibition is effective), the operation frequency of the communication given inverter is negative or the external given reverse operation command, and the inverter operates at 0Hz.

The function of input terminal 49 "reverse frequency static" is the same as that of P0-21.

For applications where motor reverse rotation is not allowed, please don’t use parameter P0-21 to change the steering, because the parameter setting will be reset after restoring factory settings.

Parameter	Name	Range
P0-22	Dead time of forward and reverse rotation	0.0s~3600.0s

The transition time at the output 0Hz during the process of forward and reverse rotation is shown as t1 in the figure.



Parameter	Name	Range	
P0-23	Frequency command UP/DOWN base when operation	0	Operation frequency
		1	Setting frequency

This parameter is only valid when the frequency source is digital setting.

This parameter is used to confirm the mode to modify the setting frequency when keyboard ▲, ▼ or terminal

UP/DOWN acted, which means the target frequency is increased or decreased based on the operating frequency or the set frequency.

The difference between the two settings is obvious when the inverter is in the process of acceleration and deceleration, that is, if the operating frequency of the inverter is different from the set frequency, the different selection of this parameter is very different.

Parameter	Name	Range	
P0-25	Motor parameter group selection	0	Motor parameter group 1
		1	Motor parameter group 2

VH5 series inverter can save two groups of motor parameters, and select the current working motor parameter group through P0-25. Two motors can set their own name plate parameters, and need to complete their own parameter tuning before operation. The parameters of motor parameter group 1 are P1 parameters, and the parameters of motor parameter group 2 are A2 parameters.

4-2-2. Group P1 First motor parameters

Parameter	Name	Range
P1-00	Motor type selection	0: Common asynchronous motor 1: Synchronous motor
P1-01	Motor rated power	0.1kW~650.0kW
P1-02	Motor rated voltage	1V~1200V
P1-03	Motor rated current	0.01A~655.35A (VFD power ≤55kW） 0.1A~6553.5A (VFD power >55kW）
P1-04	Motor rated frequency	0.01Hz~max output frequency
P1-05	Motor rated speed	1rpm~65535rpm

P1-00 ~ P1-05 are the parameters on the motor nameplate. It is recommended to input these parameters manually after getting the new product.

Parameter	Name	Range
P1-06	Asynchronous motor stator resistance	0.001Ω~65.535Ω (VFD power≤55kW) 0.0001Ω~6.5535Ω (VFD power>55kW)
P1-07	Asynchronous motor rotor resistance	0.001Ω~65.535Ω (VFD power≤55kW) 0.0001Ω~6.5535Ω (VFD power>55kW)
P1-08	Leakage inductance of asynchronous motor	0.01mH~655.35mH (VFD power≤55kW) 0.001mH~65.535mH (VFD power>55kW)
P1-09	Mutual inductance of asynchronous motor	0.01mH~655.35mH (VFD power≤55kW) 0.001mH~65.535mH (VFD power>55kW)
P1-10	asynchronous motor no load current	0.01A~P1-03 (VFD power≤55kW) 0.1A~P1-03 (VFD power>55kW)
P1-15	Synchronous motor stator resistance	0.001Ω~65.535Ω (VFD power≤55kW) 0.0001Ω~6.5535Ω (VFD power>55kW)
P1-16	Synchronous motor D-axis inductance	0.01mH~655.35mH (VFD power≤55kW) 0.001mH~65.535mH (VFD power>55kW)
P1-17	Synchronous motor Q-axis inductance	0.01mH~655.35mH (VFD power≤55kW) 0.001mH~65.535mH (VFD power>55kW)

P1-19	Synchronous motor back electromotive force coefficient	0~6000.0

Generally, P1-06~P1-19 cannot be viewed on the motor body, and the response data will be automatically calculated and generated after the motor is tuned.

Parameter	Name	Range
P1-35	Motor parameter self learning	Ones place: 0: No operation 1: Static tuning 1 (part of parameters) 2: Dynamic tuning 3: Static tuning 2 Tens place: 0: Asynchronous motor 1: Synchronous motor

Generally speaking, the effect of dynamic tuning is better than that of static tuning. It is suggested to choose dynamic tuning, but dynamic tuning should separate the load from the motor. If it is difficult to separate the load from the motor, only static tuning can be selected. Both static tuning and dynamic tuning are only effective in vector mode, that is, when P0-01 is set to 1 or 2.

Tuning steps of vector control without speed sensor mode:

(1)Set P0-01 to 1, no speed sensor vector mode. Set P0-02 to 0, panel control.

(2)Set P1-00 ~ P1-05 according to the motor nameplate in turn.

(3)If it is convenient to separate the load from the motor, dynamic tuning is used, if it is not convenient to separate, static tuning is used.

(4)Take dynamic tuning as an example, set P1-35 to 2, then press the ENT key, the panel will display TUNE, then press the RUN key, the tuning will start, the TUNE light will flash slowly, and the tuning will be completed in about 2 minutes. After completion, the TUNE will disappear and the panel will display the frequency.

4-2-3. Group P2 Input terminal multi-function parameters

VH5 series inverter is equipped with 4 multifunctional digital input terminals and 1 analog input terminal. Table 4-1 provides a detailed description of each function.

Parameter	Name	Range
P2-00	Terminal X1 function selection	0~51
P2-01	Terminal X2 function selection	
P2-02	Terminal X3 function selection	
P2-03	Terminal X4 function selection	

Setting value	Function	Explanation
0	No function	The unused terminals can be set as "no function" to prevent

Setting value	Function	Explanation
		misoperation.
1	FWD operation or run command	Control the inverter forward and reverse operation through the external terminal
2	REV operation or FWD/REV operation direction	
3	Three wire operation control	Set the inverter operation mode to three wire control mode through this terminal. Please refer to the description of function code P2-10 ("terminal command mode") for details.
4	Forward jog (FJOG)	FJOG is forward jog operation, RJOG is reverse jog operation. Please refer to the description of function code PC-01 and PC-02 for jog operation frequency and jog acceleration and deceleration time.
5	Reverse jog (RJOG)	
6	Terminal UP	When the frequency is given by the external terminal, the command to increase and decrease the frequency. When the frequency source is set to digital setting, the setting frequency can be adjusted up and down.
7	Terminal DOWN	
8	UP/DOWN setting reset (terminal, keyboard)	When the frequency is set through digital frequency, this terminal can clear the frequency value changed by terminal up/down or keyboard up/down, and make the given frequency return to the value set by P0-10.
9	Free stop	The inverter blocks the output, and the motor shutdown process is not controlled by the inverter. This mode has the same meaning as free stop in P4-22.
10	Fault reset (RESET)	Use the terminal to reset the fault. It has the same function as the reset key on the keyboard. With this function, remote fault reset can be realized.
11	Frequency source switching	Main and auxiliary frequency source switching
12	Multi-segment command terminal 1	Through the 16 states of the four terminals, the setting of 16 segment speed or 16 other commands can be realized. See the attached table for details.
13	Multi-segment command terminal 2	
14	Multi-segment command terminal 3	
15	Multi-segment command terminal 4	
16	Acceleration/deceleration time selection terminal 1	Through the four states of the two terminals, four kinds of acceleration and deceleration time can be selected. See the attached table for details.
17	Acceleration/deceleration time selection terminal 2	
18	Acceleration and deceleration forbidden	Ensure that the inverter is not affected by external signals (except shutdown command), and maintain the current output frequency.
20	Counter input	Input terminal of count value.
21	Counter reset	The count value is cleared.
22	Length counting input	Input terminal of length value.

Setting value	Function	Explanation
23	Length counting reset	Clear the length counter.
24	Swing frequency pause	The inverter outputs at the center frequency. The swing function is suspended.
25	Operation pause	The inverter decelerates and stops, but all operating parameters are memorized. Such as PLC parameters, swing frequency parameters, PID parameters. After the signal of this terminal disappears, the inverter will return to the running state before shutdown.
26	PLC status reset	PLC pauses in the process of execution. When it runs again, the inverter can be restored to the initial state of simple PLC through this terminal.
27	Operation command switches to keyboard	When the terminal is valid, the operation command is switched to the keyboard
28	Operation command switches to communication	When the terminal is valid, the operation command is switched to communication
29	Torque control inhibition	It is forbidden for the inverter to control the torque, and the inverter enters the speed control mode.
30	Speed control/torque control switching	The converter is switched between torque control and speed control. When the terminal is invalid, the inverter operates in the mode defined by (PF-00). If the terminal is valid, it will be switched to another mode. During operation, it can be switched through the terminal, and the switch will take effect immediately
32	PID pause	PID is temporarily invalid, the inverter maintains the current output frequency, and no longer adjusts the PID of frequency source.
33	Reverse action direction of PID	When the terminal is effective, the PID function reverses
34	PID integral pause	When the terminal is valid, the integral regulation function of PID is suspended, but the proportional regulation and differential regulation function of PID are still valid.
35	PID parameter switching	When the PID parameter switching condition is terminal X (PA-13), and the terminal is invalid, the PID parameters use PA-10 ~ PA-12. When the terminal is valid, PA-16 ~ PA-18 are used.
36	External fault normally ON input	When the signal is sent to the inverter, the inverter will report the fault Err43 and deal with the fault according to the action mode of fault protection (see function code P7-46 for details).
37	External fault normally close input	When the normally closed signal of external fault is sent to the inverter, the inverter reports the fault ERR43 and stops.
38	User defined fault 1	When user defined fault 1 and 2 are valid, the inverter alarms Err48 and Err49 respectively. The inverter will handle according to the action mode selected by fault protection action selection (P7-47).
39	User defined fault 2	
40	Motor parameter selection terminal	Two groups of motor parameters can be switched through the two states of terminals.
41	Switching between main frequency source A and preset frequency	If the terminal is valid, frequency source A is replaced by preset frequency (P0-10)

Setting value	Function	Explanation
42	Switching between main frequency source B and preset frequency	If the terminal is valid, frequency source B is replaced by preset frequency (P0-10)
43	Frequency setting active terminal	When the terminal is valid, it is allowed to modify the frequency. If it is invalid, it is forbidden to modify the frequency
44	DC brake	When the terminal is valid, the inverter will switch to DC braking state directly
45	Deceleration DC braking	When the terminal is effective, the inverter first decelerates to the starting frequency of DC braking, and then switches to the DC braking state.
46	Emergency stop	When the terminal is effective, the inverter stops at the fastest speed, and the current is in the upper limit of the set current during the stop process. This function is used to meet the needs of the inverter to stop as soon as possible when the system is in emergency.
47	External stop terminal 1	When keyboard control, the terminal can be used to stop the inverter, which is equivalent to the function of stop key on the keyboard
48	External stop terminal 2	In any control mode (panel control, terminal control, communication control), the terminal can be used to slow down the inverter, and the deceleration time is fixed as deceleration time 4.
49	Reverse operation prohibition	When the terminal is valid, inverter reverse rotation is prohibited
50	The running time is cleared	When the terminal is valid, the inverter operation time is cleared. This function needs to be matched and used with the timing operation (PC-28) and the current operation time (PC-29).
51	Two wire / three wire switching	Used to switch between two-wire and three-wire mode Switching rule: Two-wire mode 1 switches to three-wire mode 1 Two-wire mode 2 switches to three-wire mode 2 Three-wire mode 1 switches to two-wire mode 1 Three-wire mode 2 switches to two-wire mode 2

Four multi-segment command terminals can be combined into 16 states, each of which corresponds to 16 command settings. The details are as follows:

K4	K3	K2	K1	Command setting	Parameter
OFF	OFF	OFF	OFF	Multi-segment command 0	PB-00 (PB-16=0)
OFF	OFF	OFF	ON	Multi-segment command 1	PB-01
OFF	OFF	ON	OFF	Multi-segment command 2	PB-02
OFF	OFF	ON	ON	Multi-segment command 3	PB-03
OFF	ON	OFF	OFF	Multi-segment	PB-04

				command 4	
OFF	ON	OFF	ON	Multi-segment command 5	PB-05
OFF	ON	ON	OFF	Multi-segment command 6	PB-06
OFF	ON	ON	ON	Multi-segment command 7	PB-07
ON	OFF	OFF	OFF	Multi-segment command 8	PB-08
ON	OFF	OFF	ON	Multi-segment command 9	PB-09
ON	OFF	ON	OFF	Multi-segment command 10	PB-10
ON	OFF	ON	ON	Multi-segment command 11	PB-11
ON	ON	OFF	OFF	Multi-segment command 12	PB-12
ON	ON	OFF	ON	Multi-segment command 13	PB-13
ON	ON	ON	OFF	Multi-segment command 14	PB-14
ON	ON	ON	ON	Multi-segment command 15	PB-15

When the frequency source is multi-speed, 100.0% of the function code PB-00 ~ PB-15 corresponds to the maximum frequency P0-13. In addition to the function of multi-stage speed, the multi-stage instruction can also be used as the given source of PID, or as the voltage source of VF separation control, so as to meet the needs of switching between different given values.

Terminal 2	Terminal 1	Acc/Dec time	Parameter
OFF	OFF	Acc/Dec time 1	P0-18, P0-19
OFF	ON	Acc/Dec time 2	PC-03, PC-04
ON	OFF	Acc/Dec time 3	PC-05, PC-06
ON	ON	Acc/Dec time 4	PC-07, PC-08

Parameter	Name	Function
P2-10	Terminal command mode	0: Two-wire mode 1 1: Two-wire mode 2 2: Three-wire mode 1 3: Three-wire mode 2

This parameter defines four different ways to control the operation of the inverter through the external terminal.

Note: For example, Select X1, X2 and X3 as external terminals. The functions of X1, X2 and X3 are selected by setting the values of P2-00 ~ P2-02. See the setting range of P2-00 ~ P2-03 for detailed function definition.

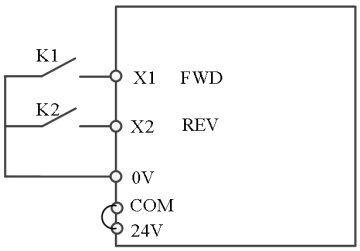
0: Two-wire mode 1

This mode is the most commonly used two-wire mode. The forward and reverse operation of the motor is

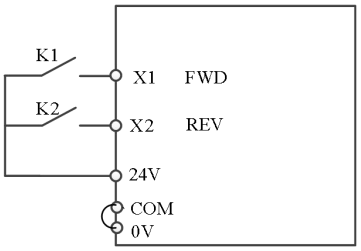
determined by terminals X1 and X2. The function code setting is as follows:

Parameter	Name	Range	Function
P2-10	Terminal command mode	0	Two-wire mode 1
P2-00	X1 function selection	1	Forward run
P2-01	X2 function selection	2	Reverse run

K1	K2	Command
1	0	Forward
0	1	Reverse
1	1	Stop
0	0	Stop



NPN leakage wiring



PNP source wiring

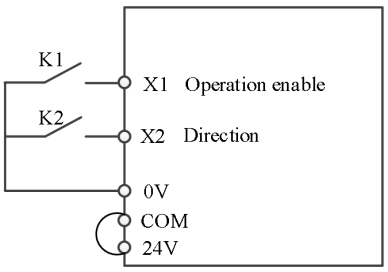
As shown in the figure, in this control mode, when K1 is closed, the converter runs in forward direction. When K2 is closed, the inverter runs in reverse.When K1 and K2 are closed or disconnected at the same time, the inverter stops running.

1: Two-wire mode 2

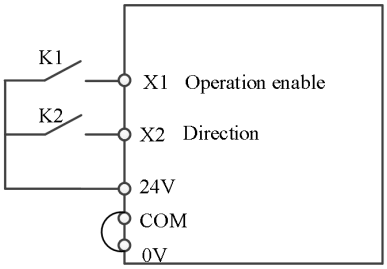
In this mode, X1 terminal function is operation enable terminal, while X2 terminal function determines operation direction. The function code setting is as follows:

Parameter	Name	Range	Function
P2-10	Terminal command mode	1	Two-wire mode 2
P2-00	X1 function selection	1	Operation enable
P2-01	X2 function selection	2	FWD/REV operation direction

K1	K2	Command
1	0	Forward
1	1	Reverse
0	0	Stop
0	1	Stop



NPN leakage wiring



PNP source wiring

As shown in the figure,

when K1 is closed:When K2 is opened, the inverter runs in forward direction.

When K2 is closed, the inverter runs in reverse direction.

When K1 is opened: the inverter stops running.

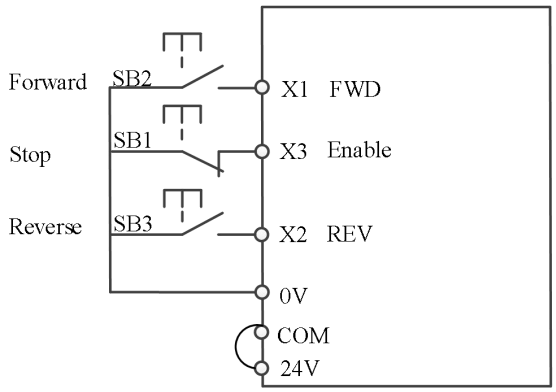
2: Three-wire mode 1

In this mode X3 is enable terminal, X1 and X2 control the direction.

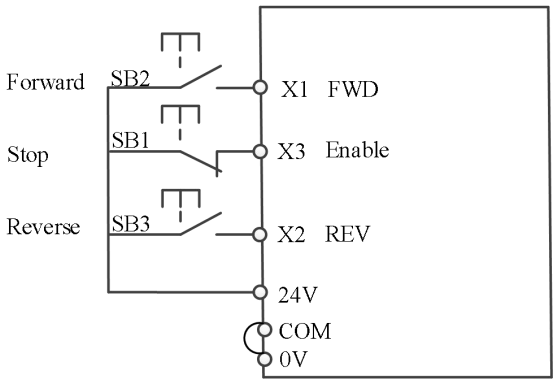
The function code setting is as follows:

Parameter	Name	Range	Function
P2-10	Terminal command mode	2	Three-wire mode 1
P2-00	X1 function selection	1	Forward run
P2-01	X2 function selection	2	Reverse run

P2-02	X3 function selection	3	Three-wire control mode



NPN leakage wiring



PNP source wiring

As shown in the figure, in the control mode, when SB1 button is closed, press SB2 button, the inverter rotates forward, and then press SB3 button, the inverter reverses, SB1 button is disconnected, and the inverter stops. During normal start-up and operation, SB1 button must be kept closed, SB2 and SB3 button commands will take effect at the closing action edge, and the operation state of inverter is subject to the last action of the three buttons.

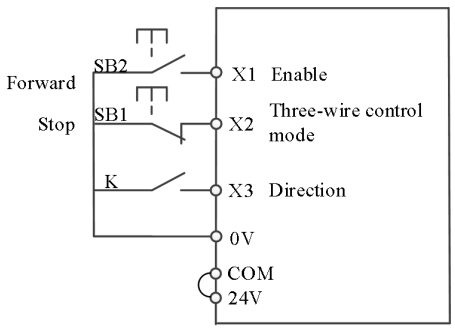
3: Three-wire control mode 2

In this mode, X2 is enable terminal, X1 controls the operation, X3 controls the direction.

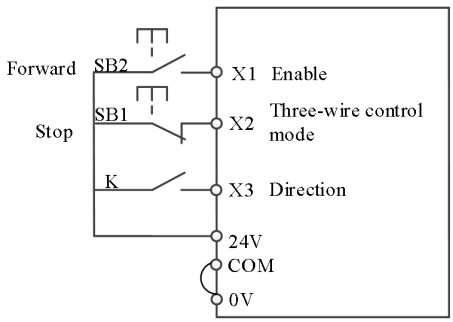
The function code setting is as follows:

Parameter	Name	Range	Function
P2-10	Terminal command mode	3	Three-wire mode 2
P2-00	X1 function selection	1	Operation enable
P2-01	X2 function selection	3	Three-wire control mode
P2-02	X3 function selection	2	FWD/REV operation direction

K	Command
0	Forward
1	Reverse



NPN leakage wiring



PNP source wiring

As shown in the figure, in the SB1 button closed state, press the SB2 button, the inverter runs, K opens the inverter forward, K closes the inverter reverse. When SB1 button is off, the inverter stops. During normal start-up and operation, SB1 button must be kept closed, and SB2 button command will take effect at the closing action edge.

Parameter	Name	Range
P2-11	Terminal UP/DOWN changing rate	0.001Hz/s~50.000Hz/s

It is used to set the speed of frequency change when the terminal up / down adjusts the set frequency, that is, the

change of frequency per second.

Parameter	Name	Range
P2-12	X filter time	0.000s~1.000s

Set the software filter time of X terminal state. If the input terminal is easy to be disturbed and cause misoperation, this parameter can be increased to enhance the anti-interference ability. However, the increase of the filtering time will slow down the response of the X terminal.

Parameter	Name	Range
P2-13	X1 delay time	0.0s~3600.0s
P2-14	X2 delay time	0.0s~3600.0s
P2-15	X3 delay time	0.0s~3600.0s

It is used to set the delay time of inverter when the state of X terminal changes.

At present, only X1, X2 and X3 have the function of setting the delay time.

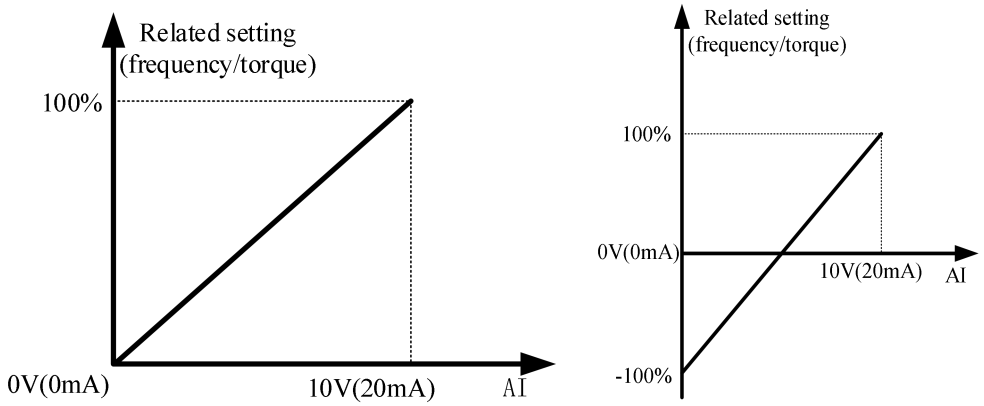
Parameter	Name	Content	Range
P2-16	X1 terminal valid state setting	Ones bit	0: Low level valid 1: High level valid
	X2 terminal valid state setting	Tens bit	0: Low level valid 1: High level valid
	X3 terminal valid state setting	Hundreds bit	0: Low level valid 1: High level valid
	X4 terminal valid state setting	Thousands bit	0: Low level valid 1: High level valid

This function code is used to set the effective state of the input terminal of the inverter.

Parameter	Name	Range
P2-18	AI curve 1 min setting	0.00V~P2-20
P2-19	AI curve 1 min setting corresponding frequency percentage	-100.0%~+100.0%
P2-20	AI curve 1 max setting	P2-18~+10.00V
P2-21	AI curve 1 max setting corresponding frequency percentage	-100.0%~+100.0%
P2-22	AI curve 2 min setting	0.00V~P2-24
P2-23	AI curve 2 min setting corresponding frequency percentage	-100.0%~+100.0%
P2-24	AI curve 2 max setting	P2-22~+10.00V
P2-25	AI curve 2 max setting corresponding frequency percentage	-100.0%~+100.0%

AI curve parameters are used to set the relationship between analog input voltage and its representative setting value, as shown in the figure below.

When the analog input is greater than the maximum setting (less than the minimum setting), it is calculated according to the maximum setting (minimum setting). Two typical settings are provided as follows:



The functions of AI curve 1 (P2-18~P2-21) /AI curve 3 (P2-26~P2-29) are same to AI curve2.

(Below version 3744) Factory default, the correspondence between the input voltage value of AI and the target frequency is curve 2, and the corresponding parameters are set between P2-22 and P2-25.

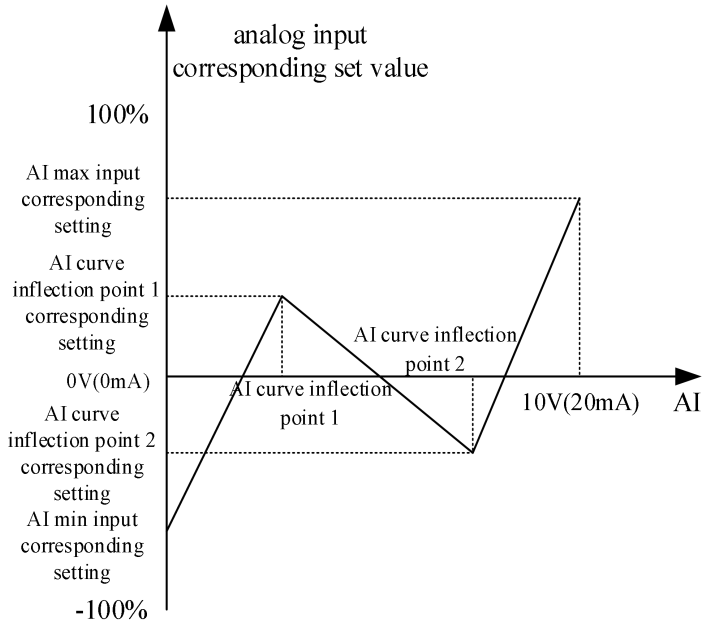
(3744 version and above) Factory default, the correspondence between the input voltage value of AI and the target frequency is curve 1, and the corresponding parameters are set between P2-18 and P2-21.

Parameter	Name	Range
P2-30	AI curve 4 min input	0V~P2-32
P2-31	AI curve 4 minimum input corresponding setting	-100.0%~+100.0%
P2-32	AI curve 4 inflection point 1 input	P2-30~P2-34
P2-33	AI curve 4 inflection point 1 input corresponding setting	-100.0%~+100.0%
P2-34	AI curve 4 inflection point 2 input	P2-32 ~ P2-36
P2-35	AI curve 4 inflection point 2 input corresponding setting	-100.0% ~ +100.0%
P2-36	AI curve 4 max input	P2-34 ~ +10.00V
P2-37	AI curve 4 max input corresponding setting	-100.0% ~ +100.0%
P2-38	AI curve 5 min input	-10.00V ~ P2-40
P2-39	AI curve 5 minimum input corresponding setting	-100.0% ~ +100.0%
P2-40	AI curve 5 inflection point 1 input	P2-38 ~ P2-42
P2-41	AI curve 5 inflection point 1 input corresponding setting	-100.0% ~ +100.0%
P2-42	AI curve 5 inflection point 2 input	P2-40 ~ P2-44
P2-43	AI curve 5 inflection point 2 input corresponding setting	-100.0% ~ +100.0%
P2-44	AI curve 5 max input	P2-42 ~ +10.00V
P2-45	AI curve 5 max input corresponding setting	-100.0% ~ +100.0%

Curve 4 is determined by four points, which is more flexible, refer to the following figure.

The voltage/current should meet the requirement: AI min input (P2-30) ＜AI curve inflection point 1 input (P2-32) ＜AI curve inflection point 2 input (P2-34) ＜AI max input (P2-36).

Curve 5 please refer to the explanation of curve 4.



Parameter	Name	Range	
P2-54	AI curve selection	Ones bit	AI curve selection (version 3744 and above)
		1	Curve 1 (2 points, refer to P2-18~P2-21)
		2	Curve 2 (2 points, refer to P2-22~P2-25)
		3	Curve 3 (2 points, refer to P2-26~P2-29)
		4	Curve 4 (4 points, refer to P2-30~P2-37)
		5	Curve 5 (4 points, refer to P2-38~P2-45)
		Tens bit	AI curve selection, as above (below version 3744)

Curve 1, curve 2 and curve 3 are linear relations determined by two coordinate points. Curve 4 and curve 5 are broken line relations determined by four coordinate points.

Parameter	Name	Range	
P2-55	AI below minimum input setting selection	Ones bit	AI1 below minimum input setting selection (version 3744 and above)
		0	Corresponding to the minimum input setting
		1	0.0%
		Tens bit	AI1 below minimum input setting selection, as above (below version 3744)

If 0 is selected, when AI input is lower than "minimum input", the corresponding setting of the analog quantity is the "minimum input corresponding setting" (P2-18, P2-22, P2-26) of the curve determined by the parameters. If 1 is selected, when AI input is lower than the minimum input, the corresponding setting of the analog quantity is 0.0%.

Parameter	Name	Range
P2-57	AI filter time constant	0.00s~10.00s

AI filtering time constant is used to set the software filtering time of AI. When the on-site analog quantity is easy to be interfered, please increase the filtering time to make the detected analog quantity tend to be stable, but the larger the filtering time, the slower the response speed of analog quantity detection.

Parameter	Name	Range
P2-62	AI jump point	-100%~+100.0%
P2-63	AI jump range	0.0%~100.0%

The jump function is to fix the corresponding setting value of the analog quantity to the jump point when the corresponding setting of the analog quantity changes in the upper and lower intervals of the jump point.

For example: the voltage of analog input AI fluctuates up and down at 5.00V, the fluctuation range is 4.90V ~ 5.10V, the minimum input of AI 0.00V corresponds to 0.0%, and the maximum input of AI 10.00V corresponds to 100%. Then the detected AI corresponding setting fluctuates between 49.0% and 51.0%.
Set AI jump point P2-60 to 50.0%, set AI jump range P2-61 to 1.0%, then the AI1 input is fixed to 50.0%, after jump function processing, AI is transformed into a stable input, and the fluctuation is eliminated.

4-2-4. Group P3 Output terminal multi-function parameters

Each output channel function can be defined through setting parameter P3-01, P3-04.

Parameter	Name	Range
P3-01	Y1 output function selection	0~42 code functions are as follows
P3-04	Relay 1 output function selection	

Setting value	Function	Explanation
0	No output	The output terminal has no function
1	in operation	Indicates that the inverter is in operation state, with output frequency (can be zero), output ON signal.
2	Fault output (free stop fault)	When the inverter fails and stops, the ON signal is output.
3	Frequency level detection FDT1 output	Refer to PC-18, PC-19 explanation.
4	Frequency level detection FDT2 output	Refer to PC-20, PC-21 explanation.
5	Frequency reached	Refer to PC-22 explanation.
6	Zero speed operation (no output during shutdown)	When the inverter runs and the output frequency is 0, the ON signal is output. When the inverter is in the shutdown state, the signal is off.
7	Zero speed operation 2 (output during shutdown)	When the inverter output frequency is 0, the ON signal is output. The signal is also on in the shutdown state.
8	Upper limit frequency arrival	When the operating frequency reaches the upper frequency, the ON signal is output.
9	Lower limit frequency arrival (no output when shutdown)	When the operating frequency reaches the lower frequency, the ON signal is output. The signal is off in the shutdown state.
10	Motor overload warning	Before the motor overload protection action, it is judged according to the threshold of overload warning, and the ON signal is output after exceeding the threshold. Refer to function code P7-33-P7-41 for setting motor overload

Setting value	Function	Explanation
		parameters.
11	inverter overload warning	The ON signal is output 10s before the overload protection of inverter.
12	Communication setting	Refer to communication protocol.
13	Torque limit	When the set frequency exceeds the upper or lower frequency, and the frequency of the inverter also reaches the upper or lower frequency, the ON signal is output.
15	Frequency 1 arrival output	Refer to PC-22, PC-23.
16	Frequency 2 arrival output	Refer to PC-24, PC-25.
17	Current 1 arrival output	Refer to PC-34, PC-35.
18	Current 2 arrival output	Refer to PC-36, PC-37.
19	The set value is reached	When the count value reaches the value set by A0-03, the ON signal is output.
20	The specified value arrived	When the count value reaches the value set by A0-04, the ON signal is output. The counting function is shown in the function description of group A0.
21	Ready to run	When the power supply of the main circuit and control circuit of the inverter is stable, and the inverter does not detect any fault information, and the inverter is in the operational state, the ON signal is output.
23	AI input overrun	When the value of analog input AI is greater than PC-43 (upper limit of AI input protection) or less than PC-42 (lower limit of AI input protection), the ON signal is output.
24	Under voltage state output	When the inverter is under voltage, it outputs ON signal.
25	Power on time arrived	When the accumulated power on time (U0-30) of the inverter exceeds the time set by PC-30, the ON signal is output.
26	Timing arrival	When the timing function (PC-26) is valid, the inverter will output ON signal when the running time reaches the set timing time (PC-28).
27	Length arrival	When the actual length detected exceeds the length set by A0-00, the ON signal is output.
28	Simple PLC cycle completion	When the simple PLC completes a cycle, it outputs a pulse signal with a width of 250ms.
29	Run time arrival	When the accumulated operation time P8-10 of the inverter exceeds the time set by PC-32, the ON signal is output.
30	Reserved	Reserved
31	Reserved	Reserved
32	Lower frequency arrival (operation related)	When the operating frequency reaches the lower frequency, the ON signal is output. The signal is off in the shutdown state.
33	Fault output (free shutdown fault and no output when under	Fault of free shutdown and no output when under voltage.

Setting value	Function	Explanation
	voltage)	
34	Module temperature arrival	When the inverter module radiator temperature (P8-19) reaches the set module temperature (PC-47), the ON signal is output
35	Fault output (output only after fault shutdown)	When the inverter fails, and the fault processing mode is continue to run, the inverter alarm output.
36	Motor over temperature alarm	Motor temperature acquisition value is greater than P7-37 value, alarm output
37	Speed direction	When the inverter is in reverse operation, it outputs ON signal.
38	Load dropping	Load suddenly unloaded
39	Software overcurrent output	Refer to PC-40, PC-41.
40	Current detection arrival output	Refer to PC-38, PC-39.
41	Current run time arrival	When the starting time of the inverter exceeds the time set by PC-29, the ON signal will be output.
42	Bus voltage reached	Refer to PC-65, PC-66

Parameter	Name	Range
P3-06	Y1 output delay time	0.0~3600.0s
P3-09	Relay 1 output delay time	0.0~3600.0s

It is used to set the delay time when the state of Y terminal changes.

Parameter	Name	Range
P3-11	Y terminal effective state selection	Ones bit: Y1 Tens bit: Y2 Hundreds bit: reserved Thousands bit: relay 1 Ten thousand bit: relay 2 0: Positive logic close valid / open invalid 1: negative logic close invalid/open valid

Parameter	Name	Range
P3-13	AO output function selection	0 ~ 13 see the following table for detailed parameter function description

Setting value	Function	Explanation
0	Operation frequency	0~max output frequency
1	Set frequency	0~ max output frequency
2	Output current	0-2 times motor rated current
3	Motor output torque (absolute, Percentage relative to motor)	0 ~ 2 times motor rated torque
4	Output power	0~2 times rated power

5	Output voltage	0~1.2 times VFD rated voltage
7	AI	0V~10V (or 0~20mA)
10	Output speed	0~ Output speed corresponding to maximum frequency
11	Communication control output	0.0%~100.0%
12	Counting value	0~max counting value
13	Length	0~max setting length

Parameter	Name	Range
P3-15	AO zero bias coefficient	-100.0~+100.0%
P3-16	AO gain	-10.00~+10.00

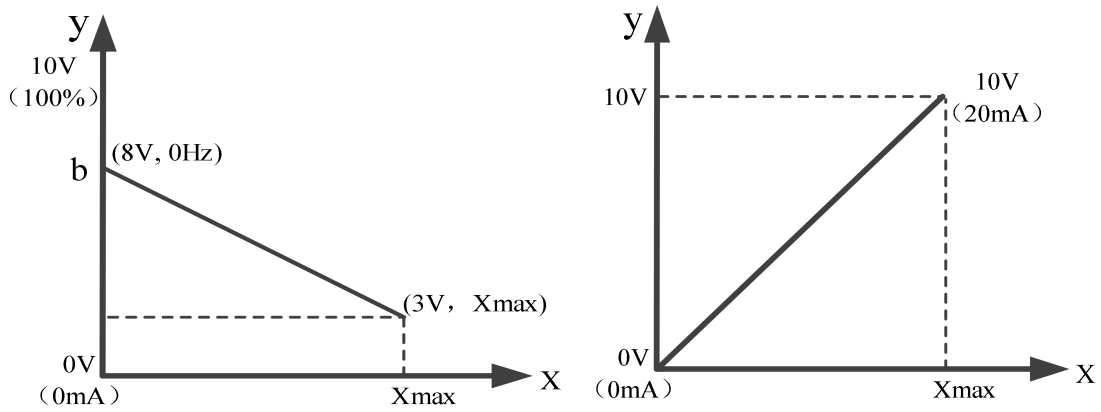
The above function codes are generally used to correct the zero drift of analog output and the deviation of output amplitude. It can also be used to customize the required AO output curve.

If the bias is represented by b, the gain is represented by k, the actual output is represented by Y, and the standard output is represented by X, then the actual output is:

$$Y = kX + b$$

Among them, 100% of the bias coefficient of AO1 corresponds to 10V (or 20mA), and the standard output refers to the amount of 0V ~ 10V (or 0mA ~ 20mA) corresponding to the analog output without bias and gain correction.

For example, if the analog output content is the operating frequency, and you want the actual output to be 8V (or 16mA) when the frequency is 0, as shown in the figure below, you need to set the zero offset to "80%". If you want to output 3V (or 6mA) at the maximum frequency, as shown in the figure below, you need to set the gain to "- 0.50".



$$\text{Zero bias coefficient} = \frac{\text{output at 0Hz}}{\text{max output}} \times 100\%$$

$$\text{Gain} = \frac{\text{output at max frequency- output at 0Hz}}{\text{max output}}$$

4-2-5. Group P4 Startup brake parameters

Parameter	Name	Range
P4-00	Startup mode	0: Direct start 1: Speed tracking restart (AC asynchronous motor) 2: Pre-excitation start (AC asynchronous motor)

Note: This parameter needs to be modified in vector control mode (P0-01=1 or 2)
(supported by **3740 and above versions in VF control mode**)
0: Direct start
Suitable for small inertia load

1: Speed tracking restart
It is suitable for the case of instantaneous power loss and restart of large inertia load. At this time, the corresponding parameters of P4 group should be set correctly.

2: Pre-excitation start (AC asynchronous motor)
It is only effective for AC asynchronous motor, and magnetic field is established before motor is running. If the pre-excitation time P4-04 is not 0, the dynamic response performance of the motor can be improved by pre-excitation and then starting.
If the pre-excitation time is set to 0, the inverter cancels the pre-excitation process and starts from the start frequency.

Parameter	Name	Range
P4-01	Starting frequency	0.00Hz~10.00Hz
P4-02	Start frequency duration	0.0s~100.0s
P4-03	Starting DC brake current/pre-excitation current percentage	0%~100%
P4-04	DC braking time during startup/pre-excitation time	0.0s~100.0s

If the starting DC braking time is set to 0, the inverter starts to run from the starting frequency.
If the starting DC braking time is not 0, the DC braking is performed first, and then run at the starting frequency. It is suitable for small inertia load, where the motor may rotate when starting.
Starting DC braking is only effective when the starting mode is direct starting. At this time, the inverter starts DC braking according to the set starting DC braking current, and then starts to run after starting DC braking time. If the DC braking time is set to 0, it will start directly without DC braking. The greater the DC braking current is, the greater the braking force is.
If the starting mode is pre-excitation starting of asynchronous motor, the inverter first establishes the magnetic field according to the set pre-excitation current P4-03, and then starts to run after the set pre-excitation time P4-04. If the pre-excitation time is set to 0, it will start directly without pre-excitation process.
When the rated current of the motor is less than or equal to 80% of the rated current of the inverter, it is the percentage base value relative to the rated current of the motor. When the motor rated current is greater than 80% of the rated current of the inverter, it is relative to 80% of the rated current of the inverter as the percentage base value.

Parameter	Name	Range
P4-05	Starting protection selection	0: no protection 1: with protection

If P4-05 is set to 1, when the inverter start-up and stop is set to terminal start-up and stop, the start-up terminal will be triggered again after power failure and restart.

Parameter	Name	Range
P4-06	Speed tracking mode(Only valid for asynchronous motors)	0: Starting from the shutdown frequency 1: Starting from power frequency 2: Starting from maximum output frequency
P4-07	Speed tracking speed	1~100

In order to realize the smooth and shock free starting of the rotating motor. The inverter first judges the speed and direction of the motor, and then starts the motor with the tracking frequency. There are three ways to track the speed:

0: Track down from the frequency of power failure, which is usually selected.

1: It can be used when the power frequency is switched, and it can be used when the power is cut off for a long time.

2: Track down from the maximum frequency, often used by power generating load.

P4-07 is used to set the tracking speed when the speed tracking is restarted. The larger the parameter setting value is, the faster the tracking speed is. However, too much leads to unreliable tracking effect.

Parameter	Name	Range
P4-10	Speed tracking closed loop current	30%~200%

The maximum current in the speed tracking process is limited within the set value of "speed tracking current". If the setting value is too small, the effect of speed tracking will be worse.

Parameter	Name	Range
P4-19	Acceleration deceleration mode	0: Linear acceleration and deceleration 1: Continuous S-curve acceleration and deceleration 2: Intermittent S-curve acceleration and deceleration

0: Linear acceleration and deceleration

The output frequency increases or decreases linearly. Four kinds of acceleration and deceleration time (P0-18 ~ P0-19, PC-03 ~ PC-08) can be selected through the multi-function input terminal (P2-00 ~ P2-09).

1: Continuous S-curve acceleration and deceleration

When the target frequency is fixed, the output frequency is increased or decreased according to the S curve. It is suitable for the case of slow start or shutdown.

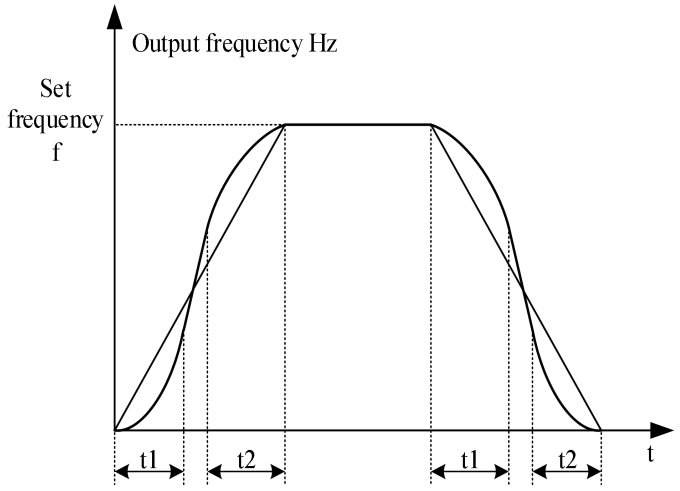
2: Intermittent S-curve acceleration and deceleration

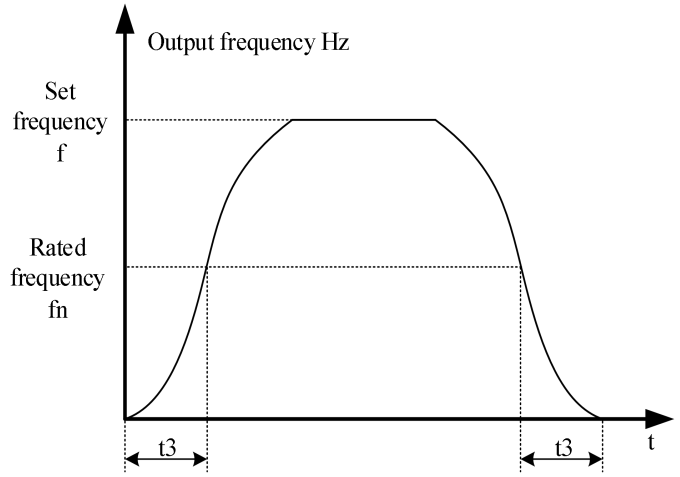
It is suitable for the real-time change of target frequency and rapid response. The output frequency is increased or decreased in real time according to S curve. It is suitable for occasions with high comfort requirements and fast response.

Parameter	Name	Range
P4-20	S curve starting segment proportion	0.0%~ (100.0%-P4-21)
P4-21	S curve end segment proportion	0.0%~ (100.0%-P4-20)

When selecting static S-curve, the sum of parameters P4-20 and P4-21 must be less than or equal to 100%.

In the figure, t1 is the proportion of the beginning segment of S-curve defined by P4-20, t2 is the proportion of the end segment of S-curve defined by P4-21, and the slope of output frequency change between t1 and t2 is a fixed value, which is linear acceleration and deceleration. As shown in the figure.





Parameter	Name	Range
P4-22	Stop mode	0: Deceleration stop 1: Free stop
P4-23	Starting frequency of DC braking during shutdown	0.00Hz~max output frequency P0-13
P4-24	DC braking waiting time during shutdown	0.0s~100.0s
P4-25	Percentage of DC braking current at shutdown	0%~100%
P4-26	DC brake time during shutdown	0.0s~100.0s

When the stop mode is deceleration stop, the shutdown shall be conducted according to the set deceleration time. If the lower limit frequency P0-17 is set, it will decelerate to P0-17, and then it will be free stop.

DC braking is applicable to the situations where braking is performed before starting operation and torque is required to be maintained after braking to zero speed. It is not applicable to the situations where large inertia load is quickly braked and motor is braked at high speed. It doesn't need braking resistor.

Braking process: the inverter drops according to the set deceleration time. When the frequency drops to P4-23, wait for the time set by P4-24, and then brake with the current set in P4-25. The braking waiting time is P4-26. The braking effect depends on the actual operating conditions. If the machine does not stop within the DC braking time, the shutdown state will automatically switch to free shutdown.

4-2-6. Group P5 VF parameters

Parameter	Name	Range	
P5-00	VF curve setting	0	Line VF
		1	Multi-point VF
		2	Square VF
		3	1.2 square VF
		4	1.4 square VF
		6	1.6 square VF
		8	1.8 square VF
		9	Reserved
		10	VF complete separation mode
		11	VF half separation mode

0: Line VF

Suitable for common constant torque load.

1: Multi-point VF

Suitable for dehydrator, centrifuge and other special loads. By setting P5-01 ~ P5-06 parameters, any VF relation curve can be obtained.

2: Square VF

Suitable for centrifugal loads such as fans and pumps.

3: 1.2 square VF ||4: 1.4 square VF||6: 1.6 square VF||8:1.8 square VF

VF relationship curve between line VF and square VF.

10: VF complete separation mode

The output frequency and voltage of the inverter are independent of each other. The output frequency is determined by the frequency source and the output voltage is determined by P5-09 (VF separated voltage source).

11: VF half separation mode

In the VF half separation mode, V and F are proportional, but the proportional relationship can be set through the voltage source P5-09, and the relationship between V and F is also related to the rated voltage and rated frequency of the motor in group F1.

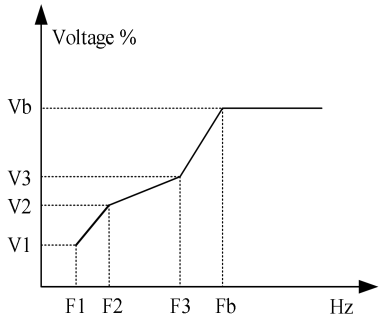
The relationship between VFD output voltage V and frequency F:

$$\frac{V}{F}=\frac{2\times A\times \text{motor rated voltage}}{\text{motor rated power}}$$

, A is percentage of voltage source input (0~100%).

Parameter	Name	Range
P5-01	Multi-point VF frequency point F1	0.00Hz~P5-03
P5-02	Multi-point VF voltage point V1	0.0~100.0%
P5-03	Multi-point VF frequency point F2	P5-01~P5-05
P5-04	Multi-point VF voltage point V2	0.0~100.0%
P5-05	Multi-point VF frequency point F3	P5-05~ (motor rated frequency) P1-04
P5-06	Multi-point VF voltage point V3	0.0~100.0%

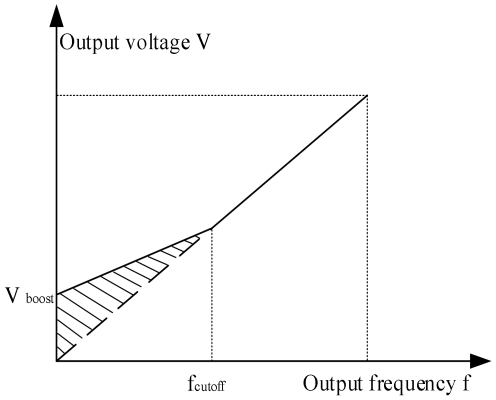
When P5-00 = 1, the VF curve user-defined multi-point VF curve, as shown in the figure below, the user uses (V1, F1), (V2, F2), (V3, F3) three-point broken line mode to define the VF curve to adapt to the special load requirements.



Note: V1 ~ V3: voltage percentage of section 1 ~ 3 of multipoint VF curve. F1 ~ F3: frequency point of section 1 ~ 3 of multipoint VF curve.

Parameter	Name	Range
P5-07	Torque boost	0.0% (auto torque boost) 0.1%~30.0%
P5-08	Torque boost cut-off frequency	0.00Hz~max output frequency P0-13

Torque boost can improve the low frequency torque characteristics of VF, reduce the torque boost when the load is light, and increase when the load is heavy and the starting torque is not enough. When the torque boost is too large, the motor will be over excited, the output current of the inverter will increase, the motor heating will increase, and the efficiency will decrease.



Parameter	Name	Range	
P5-09	The voltage source of VF separation	0	Digital setting (P5-10)
		1	AI (version 3744 and above)
		2	AI (below version 3744)
		5	Communication setting
		6	Multi-segment speed setting
		7	PID setting
		8	Simple PLC operation
		100.0% corresponding to motor rated voltage (P1-02, A2-02)	
P5-10	Voltage source digital setting of VF separation	0V~motor rated voltage	

VF separation is generally used in induction heating, inverter power supply and torque motor control.

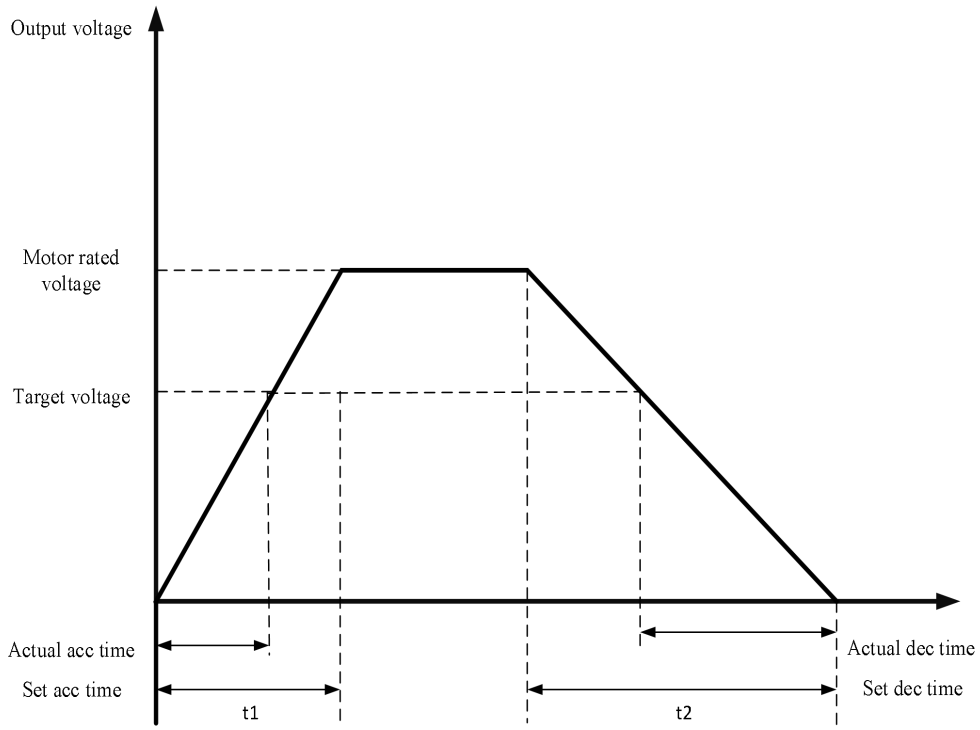
When VF separation control is selected, the output voltage can be set by parameter P5-10, or from analog quantity, multi-section instruction, PLC, PID or communication. When non digital setting is used, 100% of each setting corresponds to the rated voltage of the motor. When the percentage of analog output setting is negative,

the absolute value is taken as the effective setting value.

Parameter	Name	Range
P5-11	Voltage acceleration time of VF separation	0.0s~1000.0s Note: it indicates the time when 0V changes to the motor rated voltage
P5-12	Voltage deceleration time of VF separation	0.0s~1000.0s Note: it indicates the time when 0V changes to the motor rated voltage

The voltage rise time of VF separation refers to the time required for the output voltage to accelerate from 0 to the motor rated voltage, as shown in t1 in the figure below.

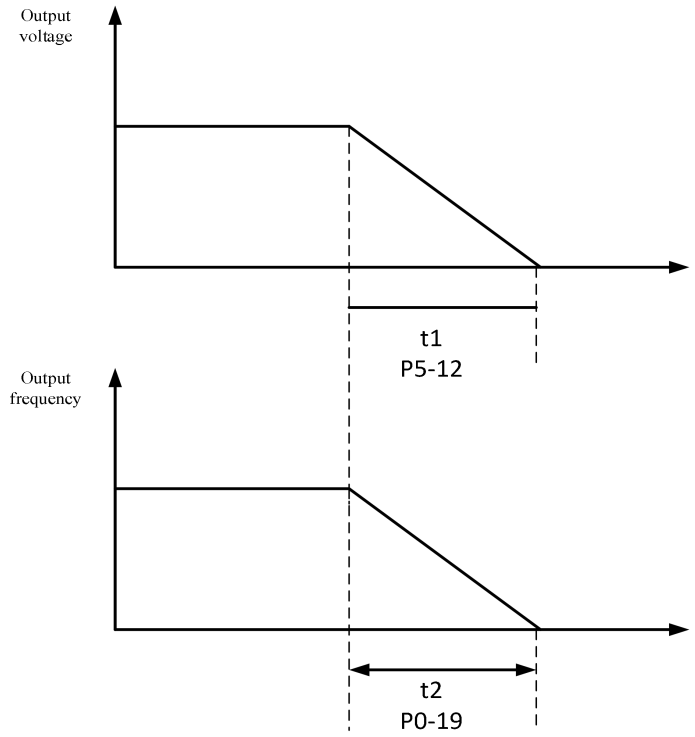
The voltage drop time of VF separation refers to the time required for the output voltage to decelerate from the motor rated voltage to 0, as shown in t2 in the figure below.



Parameter	Name	Range
P5-13	Stop mode of VF separation	0: Frequency/ voltage independently reduced to 0 1: When the voltage decreases to zero, the frequency begins to decrease

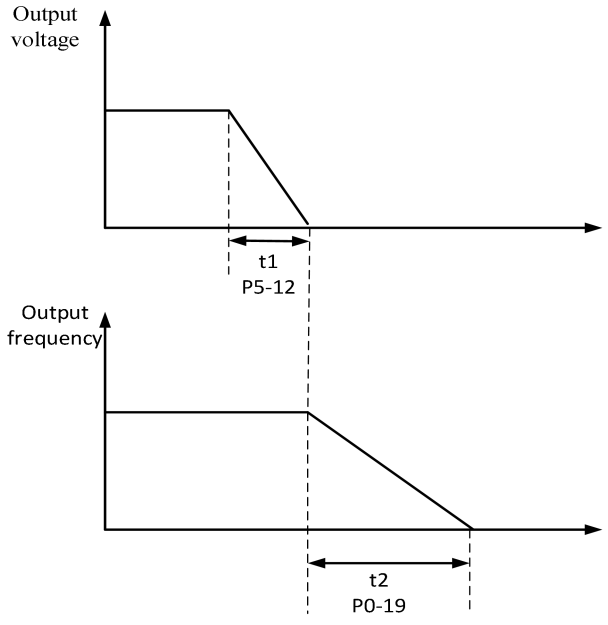
0: Frequency/ voltage independently reduced to 0

The output voltage of VF separation decreases to 0V according to the voltage drop time (P5-12). The output frequency of VF separation decreases to 0Hz according to deceleration time (P0-19).



1: When the voltage decreases to zero, the frequency begins to decrease

The output voltage of VF separation first decreases to 0V according to the voltage drop time (P5-12), then the frequency decreases to 0Hz according to the deceleration time (P0-19).



Parameter	Name	Range
P5-14	VF control slip compensation gain	0%~200%

This parameter is only effective for asynchronous motor, which compensates the motor speed deviation when the load increases, so that the motor speed can be basically stable when the load changes.

Parameter	Name	Range
P5-15	Slip compensation time constant	0.1~10.0s

The smaller the response time value of slip compensation is set, the faster the response speed is.

Parameter	Name	Range
P5-16	VF over excitation gain	0—200

In the process of inverter deceleration, the over excitation gain can inhibit the rise of bus voltage, but the larger the over excitation gain is, the larger the output current will increase. In the case of braking resistance or small inertia, which is not easy to produce overvoltage, it can be set to 0.

Parameter	Name	Range
P5-17	VF oscillation suppression gain	0—100

The gain is selected as small as possible on the premise of effectively suppressing the oscillation, so as to avoid adverse effects on VF operation. When the motor has no oscillation, please set the gain to 0. Only when the motor oscillates obviously, the gain should be increased appropriately. The larger the gain is, the more obvious the suppression of oscillation is.

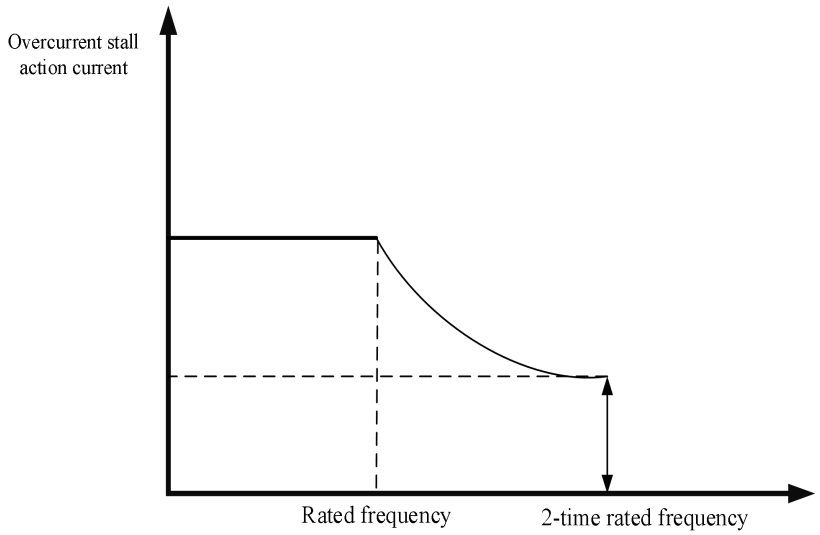
When using the function of suppressing oscillation, the parameters of rated current and no-load current should be accurate, otherwise the effect of VF oscillation suppression is not good.

Parameter	Name	Range
P5-18	VF oscillation suppression mode	0 ~ 4
P5-19	VF over current stall action current	50%~200%
P5-20	VF over current stall suppression enable	0: Invalid 1: Valid
P5-21	VF over current stall suppression gain	0 ~ 100
P5-22	VF over current stall action current compensation coefficient	50%~200%

In the high frequency region, the motor drive current is small. Below the rated frequency, the speed of the motor drops greatly with the same stall current. In order to improve the operation characteristics of the motor, the stall action current above the rated frequency can be reduced. In some centrifuges with high operation frequency, several times weak magnetic field and large load inertia are required, this method has a good effect on acceleration performance.

Transition stall action current over rated frequency = (fs/fn) * k * LimitCur,

fs is running frequency, fn is motor rated frequency, k is P5-22 (Current compensation coefficient of double speed overcurrent stall action), LimitCur is P5-19(overcurrent stall action current).



Note:

(1) 150% of over-current stall action current means 1.5 times of rated current of inverter.

(2) The carrier frequency of high-power motor is below 2kHz. Due to the increase of pulsating current, the wave by wave current limiting response precedes the over-current stall to prevent action starting, resulting in insufficient torque. In this case, please reduce the over-current stall to prevent action current.

Parameter	Name	Range
P5-23	Overvoltage stall action voltage	200.0V~2000.0V
P5-24	Overvoltage stall suppression enable	0: Invalid 1: Valid
P5-25	Overvoltage stall suppression frequency gain	0~100
P5-26	Over voltage stall suppression voltage gain	0~100
P5-27	Over voltage stall maximum rise frequency limit	0~50Hz

When the motor speed is higher than the output speed, the motor is in the state of power generation. In order to suppress the continuous rise of bus voltage, the inverter will adjust the output frequency to consume more feedback electric energy. The actual deceleration time will be automatically extended to avoid tripping. If the actual deceleration time can not meet the requirements, the over excitation gain can be appropriately increased.

Group P5 overvoltage stall parameters are valid in VF mode, and stall overcurrent parameters are both valid in VF and vector mode.

If it is found that the **actual acceleration time** of the motor is **much longer** than the acceleration time under **V/F** control mode, the following measures can be taken:

(1) If the target frequency is less than 2 times the rated frequency, the over-current stall action current of P5-19 can be increased by 10% each time. If the set value of P5-19 exceeds 170%, it is easy to cause the frequency inverter to alarm ERR10 (overload).

(2) If the target frequency is 3 times or more than 4 times the rated frequency, during the rapid acceleration process, Motor stall is likely to occur, which can adjust P5-22 over-current stall action current compensation coefficient, and the set value is 100%.

If it is found that the **actual deceleration time** of the motor is **much longer** than the deceleration time under V/F control mode, the following measures can be taken:

(1) If there is no braking resistor or energy feedback unit, the set value of P5-16 overexcitation gain can be increased by ± 20 each time. If the increase of overexcitation gain causes motor oscillation overvoltage fault, please reduce the setting value of overvoltage stall suppression voltage gain P5-26.

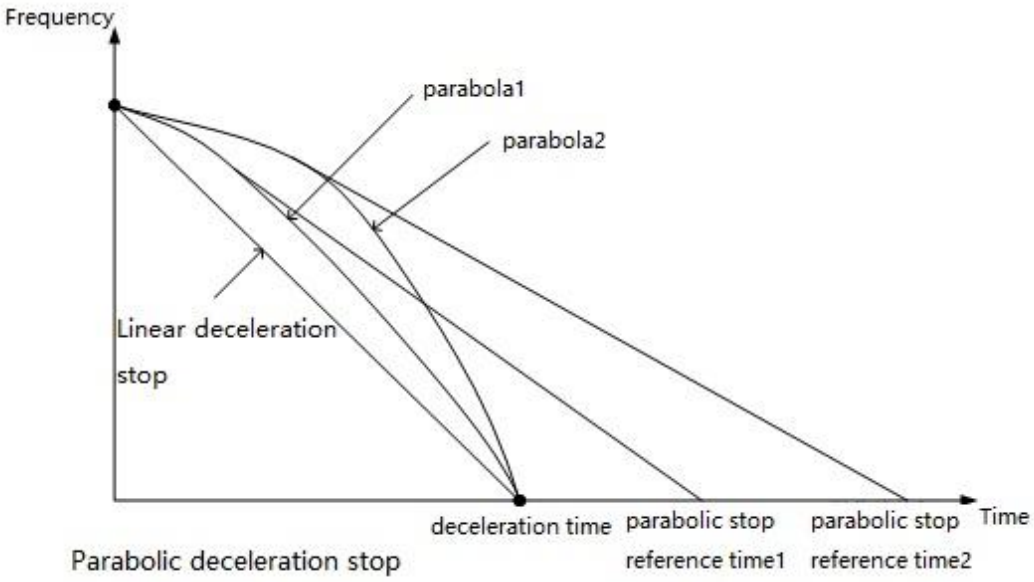
(2) If the braking resistor or energy feedback unit is added, and the input voltage level of the inverter is 323~437V, adjust the P7-53 braking starting voltage setting value to 690V, and set P5-16 (overexcitation gain) to 0. Use shutdown DC braking, and the recommended setting values are: P4-23 (shutdown DC braking starting frequency) =0.5Hz, P4-25 (shutdown DC braking current percentage) = 50%, P4-26 (shutdown DC braking time)= 1s.

Note: when using the brake resistor: P5-16 (over excitation gain) is set to 0, otherwise it is easy to cause excessive current in operation. P5-24 (overvoltage stall enable) is set to 0, otherwise the deceleration time may be too long.

Parameter	Name	Range
P5-34	PID shutdown reference voltage	0.0～1000.0v
P5-35	PID shutdown proportional gain	0～65535
P5-36	PID shutdown integral gain	0～65535
P5-37	PID shutdown differential gain	0～65535
P5-38	PID reference time for parabolic shutdown	0.0～4200.0s
P5-39	Selection of deceleration shutdown	0: Linear deceleration shutdown 1: Parabolic deceleration shutdown 2: PID deceleration shutdown

Linear deceleration shutdown: stop the machine at uniform speed according to the set deceleration time

Parabolic deceleration shutdown: use the parabolic deceleration stop, the frequency drops faster and faster. When the deceleration time is set at the same time as the reference time of the parabolic stop, it becomes a straight down frequency. The greater the parabolic stop reference time, the frequency drops slowly in the first time after the deceleration begins, and the frequency drops faster the later.



PID deceleration shutdown: The deceleration time is shortened by adjusting the proportional, integral and

differential gain of PID shutdown. It is suitable for large inertia requiring quick stop, need to be connected to the brake resistor(need to set the P5-16 overexcitation gain to 0). The deceleration time should be adjusted according to the working conditions, and the deceleration time should be set within10s. The proportional integral differential adjustment direction can first adjust the proportional gain of PID shutdown. Adjust 100 each time, adjust to a better effect, and then fine-tune. The integral gain of PID shutdown can be fine-tuned, and the differential gain of PID shutdown is generally not adjusted.

Shutdown performance: Linear deceleration shutdown<Parabolic deceleration shutdown<PID deceleration shutdown

Shutdown stability: PID deceleration shutdown<Parabolic deceleration shutdown<Linear deceleration shutdown

Notes: use PID deceleration shutdown, need to close over current stall suppression enable(P5-20=0) and over voltage stall suppression enable(P5-24=0), the deceleration time should be adjusted according to the actual working conditions.

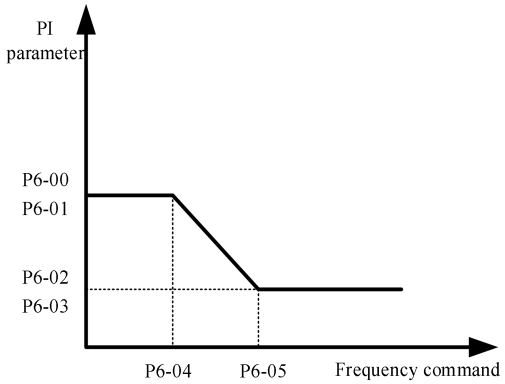
The PID reference voltage must be greater than braking start voltage. Use PID deceleration shutdown, the PID deceleration reference voltage need to set above 690V, otherwise the effect of quick stop will be played.

Use PID deceleration shutdown, need to slow down within 10s.

4-2-7. Group P6 Vector parameters

Parameter	Name	Range
P6-00	Speed loop proportional gain 1	1~100
P6-01	Speed loop integral time 1	0.01s~10.00s
P6-02	Speed loop proportional gain 2	1~100
P6-03	Speed loop integral time 2	0.01s~10.00s
P6-04	Switching frequency 1	0.00~P6-05
P6-05	Switching frequency 2	P6-04~max output frequency P0-13

Different PI parameters of speed loop can be selected when the inverter operates at different frequencies. When the operating frequency is less than the switching frequency 1 (P6-04), the PI regulation parameters of the speed loop are P6-00 and P6-01. When the operating frequency is greater than the switching frequency 2, the PI regulation parameters of the speed loop are P6-02 and P6-03. The PI parameters of speed loop between switching frequency 1 and switching frequency 2 are linear switching of two groups of PI parameters, as shown in the figure below:



By setting the proportional coefficient and integral time of the speed regulator, the speed dynamic response characteristics of the vector control can be adjusted.

Increasing the proportional gain and decreasing the integration time can accelerate the dynamic response of the speed loop. Improper setting of PI parameters may lead to excessive speed overshoot. Even when the overshoot falls back, overvoltage fault occurs.

The recommended adjustment method is as follows:

If the factory parameters can not meet the requirements, fine-tuning should be carried out on the basis of the factory parameters.

Firstly, the proportional gain should be increased to ensure that the system does not oscillate. Then the integration time is reduced to make the system have faster response characteristics and smaller overshoot.

Parameter	Name	Range
P6-06	Speed loop integral attribute	Ones bit: Integral separation 0: Invalid 1: Valid
P6-07	Vector slip compensation gain	50%~200%

This parameter is used to adjust the steady speed accuracy of the motor: when the motor speed is low with load, the parameter will be increased, and vice versa.

For vector control with speed sensor, this parameter can adjust the output current of inverter with the same load.

Parameter	Name	Range
P6-08	SVC speed feedback filter time	0.000s~0.100s

The speed feedback filtering time of SVC takes effect only when P0-01 = 0. Increasing P6-08 can improve the stability of the motor, but the dynamic response becomes weak. On the contrary, the dynamic response becomes stronger, but too small will cause the motor vibration. In general, it no needs to adjust.

Parameter	Name	Range	
P6-10	Speed control (drive) torque upper limit source	0	Set by P6-11
		1	AI (version 3744 and above)
		2	AI (below version 3744)
		5	Communication setting
		Full scale of 1~7 corresponds to P6-11	
P6-11	Speed control (drive) torque upper limit digital setting	0.0%~200.0%	

In speed control mode, the maximum output torque of the inverter is controlled by the torque upper limit source. P6-10 is used to select the setting source of torque upper limit. When setting through the analog quantity, communication, the corresponding setting 100% corresponds to P6-11, while the 100% of P6-11 corresponds to the rated output current of the converter.

The setting of AI is described in the relevant description of AI curve of group P2 (corresponding curve is selected through P2-54).

When the setting source of the torque upper limit is communication setting, the torque value is given through the mapped U4-06.

Parameter	Name	Range
P6-14	Excitation regulation proportional gain	0 ~ 60000
P6-15	Excitation regulation integral gain	0 ~ 60000
P6-16	Torque regulation proportional gain	0 ~ 60000
P6-17	Torque regulation integral gain	0 ~ 60000

The PI parameter of vector control current loop can be obtained automatically after the dynamic tuning of asynchronous motor, which generally does not need to be modified.

It should be noted that the integral regulator of the current loop does not use the integral time as the dimension, but directly sets the integral gain.

If the PI gain of the current loop is set too large, the whole control loop may oscillate. Therefore, when the current oscillates or the torque fluctuates greatly, you can manually reduce the PI proportional gain or integral gain here.

4-2-8. Group P7 Fault and protection

Parameter	Name	Fault code
P7-00	Third (last) fault type	0~56
P7-01	Second fault type	
P7-02	First fault type	

Record the latest three fault types of inverter, 0 is no fault. For the possible causes and solutions of each fault code, please refer to the relevant fault description.

Parameter	Name	Fault code
P7-03	Frequency of the third fault	Frequency of latest failure
P7-04	Current of the third fault	Current of latest failure
P7-05	Bus voltage of the third fault	Bus voltage of latest failure
P7-06	Input terminal state of the third fault	The status of digital input terminal in the latest fault, the order is: BIT9 BIT8 BIT7 BIT6 BIT5 BIT4 BIT3 BIT2 BIT1 BIT0 X10 X9 X8 X7 X6 X5 X4 X3 X2 X1 When the input terminal is on, the corresponding binary bit is 1, and off is 0. The status of all X is converted to decimal number display.
P7-07	Output terminal state of the third fault	The status of digital output terminal in the latest fault, the order is: BIT4 BIT3 BIT2 BIT1 BIT0 Relay 2 Relay 1 Y3 Y2 Y1 When the output terminal is ON, the corresponding binary bit is 1, and OFF is 0. The status of all Y is converted to decimal number display.
P7-08	VFD state of the third fault	Reserved
P7-09	The power-on time of the third fault	Present power on time of the latest fault
P7-10	The operation time of the third fault	Present operation time of the latest fault
P7-11	Location information of the third fault	Location information of last failure
P7-13	The frequency of the second fault	Same to P7-03~P7-10
P7-14	The current of the second fault	
P7-15	The bus voltage of the second fault	
P7-16	Input terminal state of the second	

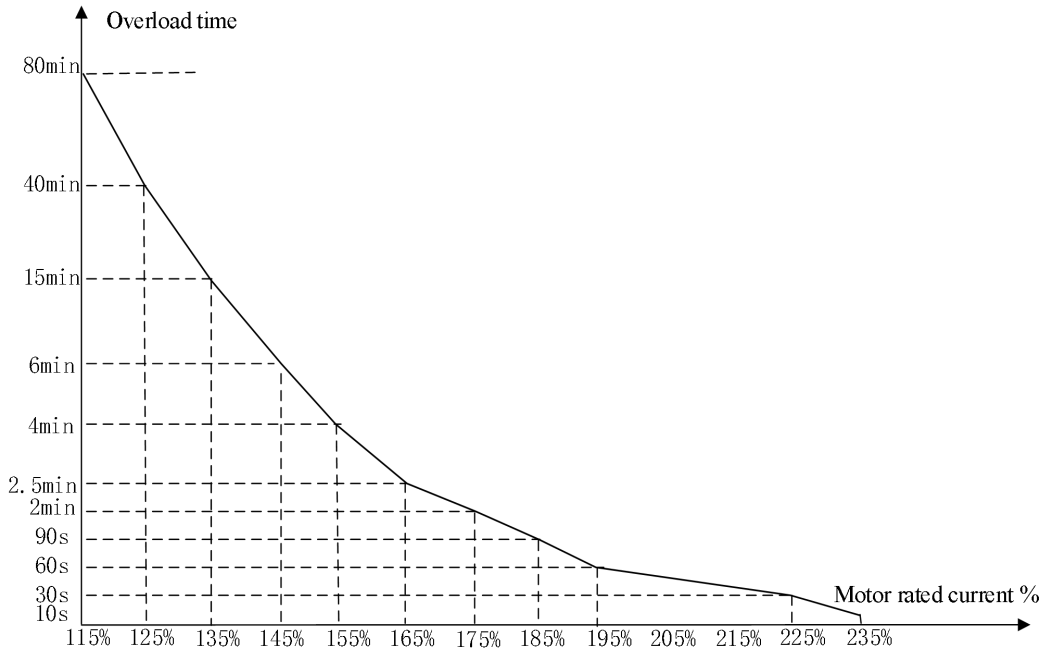
	fault	
P7-17	Output terminal state of the second fault	
P7-18	VFD state of the second fault	
P7-19	The power-on time of the second fault	
P7-20	The operation time of the second fault	
P7-21	Location information of the second fault	Position information when fault
P7-23	Frequency of the first fault	Same to P7-03~P7-10
P7-24	Current of the first fault	
P7-25	Bus voltage of the first fault	
P7-26	Input terminal state of the first fault	
P7-27	Output terminal state of the first fault	
P7-28	VFD state of the first fault	
P7-29	The power-on time of the first fault	
P7-30	The operation time of the first fault	
P7-31	Location information of the first fault	Position information when fault

Parameter	Name	Range
P7-33	Motor overload protection mode selection	0: Forbidden 1: Allowed
P7-34	Motor overload protection gain	0.20~10.00
P7-35	Motor overload warning coefficient	50%~100%

When P7-33 is set to 0, the motor has no overload protection function, it is recommended to install the heating relay before the motor.

When P7-33 is set to 1, the inverter has the ability to protect the motor overload. Refer to P7-34 and P7-35 for protection settings.

In order to protect different load motors effectively, it is necessary to set the parameters according to the overload capacity of the motor. The inverse time limit curve of motor overload protection is shown in the figure below.



(1) Theoretically, when the running current of the motor reaches 175% times of the rated current of the motor, the motor overload (Err10) will be reported after continuous running for 2 minutes. When the running current of the motor reaches 115% of the rated current of the motor, the motor overload (Err10) will be reported after continuous operation for 80 minutes.

The maximum overload time is 80 minutes and the minimum overload time is 10 seconds.

(2) For example, motor overload protection adjustment: it is required that the motor should operate for 2 minutes under 150% motor current to report overload. According to the motor overload curve diagram, 150% (I) current is in the current range of 145% (I1) and 155% (I2), 145% of current is overloaded for 6 minutes (T1), 155% of current is overloaded for 4 minutes (T2), so the 150% overload of the rated current for 5 minutes under the default setting is calculated as follows:

T=T1＋(T2－T1)*(I－I1)/(I2－I1)=4＋(6－4)*(150%－145%)/(155%－145%)=5 minutes

It can be concluded that the motor needs to report overload in 2 minutes under the condition of 150% motor current. Motor overload protection gain: P7-34=2÷5=0.4

Note: the user needs to set the value of P7-34 correctly according to the actual overload capacity of the motor. If the parameter is set too large, it is easy to cause the motor overheating damage and the inverter does not alarm and protect in time!

Parameter	Name	Range
P7-39	Input phase lack protection	Ones bit: input phase lack protection Tens bit: Contactor closing protection selection 0: Forbidden 1: Allowed

Select whether to protect the input phase loss or contactor closing.

Parameter	Name	Range
P7-40	Output phase lack protection	0: Forbidden 1: Allowed

Choose whether to protect the output phase lack. If 0 is selected, the fault will not be reported when the actual output phase lack occurs. At this time, the actual current is larger than the current displayed on the panel. There

is a risk. Please use it cautiously.

Parameter	Name	Range
P7-41	Power on short circuit to ground protection function	0: invalid 1: valid

When the inverter is powered on, it can detect whether the motor is short circuited to the ground.
If this function is effective, the UVW end of the inverter will have voltage output for a period of time after power on.

Parameter	Name	Range
P7-42	Action selection of fault relay during automatic fault reset	0: no action 1: action

If the inverter is equipped with automatic fault reset function, fault Y action during automatic fault reset can be set through P7-42 (P7-42 is only effective for Y terminal).

Parameter	Name	Range
P7-43	Interval time of automatic fault reset	0.1s~60.0s

This parameter is used as the wait time from the fault occurrence to the automatic reset of the fault.

Parameter	Name	Range
P7-44	Fault automatic reset times	0~20

This parameter is used as the times of automatic reset after the failure of the inverter, and the inverter maintains the failure state after exceeding the set value.

Parameter	Name	Range
P7-45	Protection action 1 when fault	Ones bit: motor overload (Err 10) 0: free stop 1: stop as stop mode Tens bit: input phase lacking (Err11) 0: free stop 1: stop as stop mode Hundreds bit: output phase lacking (Err12) 0: free stop 1: stop as stop mode Thousands bit: output load drop (Err19) 0: free stop 1: stop as stop mode Ten thousand bit: pole position detection failed (Err21) 0: free stop 1: stop as stop mode

Parameter	Name	Range
P7-46	Protection action 2 when fault	Ones bit: external fault 1 (Err43) 0: free stop 1: stop as stop mode Tens bit: communication error (Err44) 0: free stop 1: stop as stop mode Hundreds bit: EEPROM read write error (Err45) 0: free stop 1: stop as stop mode Thousands bit: operation time reached (Err46) 0: free stop 1: stop as stop mode Ten thousand bit: power on time reached (Err47) 0: free stop 1: stop as stop mode
P7-47	Protection action 3 when fault	Ones bit: user defined fault 1 (Err48) 0: free stop 1: stop as stop mode Tens bit: user defined fault 2 (Err49) 0: free stop 1: stop as stop mode Hundreds bit: PID feedback lost in operation (Err50) 0: free stop 1: stop as stop mode Thousands bit: speed deviation too large (Err52) 0: free stop 1: stop as stop mode Ten thousand bit: motor over speed (Err53) 0: free stop 1: stop as stop mode
P7-48	Protection action 4 when fault	Ones bit: motor overheat (Err54) 0: free stop 1: stop as stop mode

Parameter	Name	Range
P7-52	Braking start voltage	200.0~2000.0V
P7-53	Braking service rate	0~100%

When the bus voltage reaches the P7-52 setting value, the brake resistance starts to work, and the service rate of the brake resistance is adjusted through P7-53.

Parameter	Name	Range
P7-55	Over voltage stall gain	0~100
P7-56	Over voltage stall protection voltage	650V~800V

Parameter	Name	Range
P7-63	Over speed detection value	0.0%~50.0% (max frequency)
P7-64	Over speed detection time	0.0s~60.0s

This function is only effective when the inverter is running with speed sensor vector control.

When the inverter detects that the actual speed of the motor exceeds the maximum frequency, the exceeding value is greater than the over speed detection value P7-63, and the duration is greater than the over speed detection time P7-64, the inverter fault alarms Err53 and it shall be handled according to the action mode of fault protection.

When the over speed detection time is 0.0s, the over speed fault detection is cancelled.

Parameter	Name	Range
P7-65	Detection value of excessive speed deviation	0.0%~50.0% (max frequency)
P7-66	Detection time of excessive speed deviation	0.0s~60.0s

This function is only effective when the inverter is running with speed sensor vector control.

When the inverter detects that the actual speed of the motor deviates from the set frequency, the deviation is greater than the detection value P7-65, and the duration is greater than the detection time P7-66, the inverter fault alarms Err52 and it shall be handled according to the action mode of fault protection.

When the detection time of speed deviation is 0.0s, the fault detection of excessive speed deviation is cancelled.

The VH5 series does not support FVC mode (P0-01=2).

Parameter	Name	Range
P7-67	Selection of instantaneous stop non-stop function	0: Transient power failure invalid 1: Deceleration in case of instantaneous power failure 2: Deceleration stop in case of instantaneous power failure
P7-68	Pause judgement voltage of transient stop action	80%~100%
P7-69	Judgment time of instantaneous stop non-stop voltage rising	0.0s~30.0s
P7-70	Judgement voltage of instantaneous stop non-stop action	60%~100% (standard bus voltage)
P7-71	Proportional gain of instantaneous stop non-stop	0~100
P7-72	Integral coefficient of instantaneous stop non-stop	0~100
P7-73	Deceleration time of instantaneous stop	0~300.0s

	non-stop	

The purpose of instantaneous stop non-stop is to ensure that when the power supply of the power grid is abnormal, the motor can decelerate and stop normally, so that the motor can start immediately after the power supply of the power grid is restored, and it will not stop freely because of the sudden undervoltage fault when the power supply of the power grid is abnormal. In the large inertia system, it takes a long time for the motor to stop freely. When the power supply of the power grid is normal, because the motor is still rotating at high speed, it is easy to cause overload or over-current fault when starting the motor.

4-2-9. Group P8 Keyboard and display

Parameter	Name	Range
P8-00	JOG/REV function selection	0: Menu switching 1: Forward and reverse switching 2: Forward jog 3: Reverse jog

The JOG/REV key is a multi-function key, and the function of the multi-function key can be set through the function code. This key can be used to switch between shutdown and operation.

0: Menu switching

The display of the three function codes is switched by multi-function keys, corresponding to the parameter setting of P8-05, and the selected parameters and modified parameters are displayed.

1: Forward and reverse switching

Switch the direction of frequency command through the multi-function key. This function is only valid when the command source is the command channel of the operation panel.

2: Forward jog

Through the multi-function key to achieve forward jog.

3: Reverse jog

Through the multi-function key to achieve reverse jog.

Parameter	Name	Range
P8-01	STOP/REST function	0: Only in keyboard operation mode, STOP/REST key shutdown function is effective 1: In any operation mode, the STOP/REST key is effective

Parameter	Name	Range
P8-02	Parameter initialization	0: No operation 1: Restore factory parameters, excluding motor parameters 1: Restore factory parameters, excluding motor parameters and P0-13, P0-15 (supported by 3730 and above versions) 2: Clear record information 3: Restore factory parameters (including motor parameters) 4: Backup current user parameters (only supported by LCD panel) 5: Restore user backup parameters (only supported by LCD panel)

1. Restore factory settings, excluding motor parameters

After P8-02 is set to 1, except for motor parameters, other functional parameters of inverter are restored to factory parameters.

1: Restore factory parameters, excluding motor parameters and values of P0-13 and P0-15 (supported by 3730 and above versions)
After setting P8-02 to 1, most of the functional parameters of the frequency converter are restored to the manufacturer's factory parameters, but the motor parameters and the values of P0-13 and P0-15 are not restored.

2. Clear record information
Clear the inverter fault record information, cumulative operation time (P8-10), cumulative power on time (P8-11), cumulative power consumption (P8-12).

3.Restore factory parameters (including motor parameters)
After setting P8-02=3, most of the functional parameters of the inverter including motor parameters are stored to the factory parameters. But some parameters such as fault record information, cumulative operation time (P8-10), cumulative power on time(P8-11), cumulative power consumption (P8-12),module radiator temperature (P8-19) are not restored.

4.Backup current user parameters (only supported by LCD panel)
Back up the parameters set by user. Back up the settings of all current function parameters. For the convenience of customers to recover after parameter adjustment errors.

5. Restore user backup parameters (LCD panel support)
Restore the user parameters previously backed up by setting P8-02=4.

Parameter	Name	Range
P8-03	User password	0~65535

If any non-zero number is set in P8-03, the password protection function will take effect. The next time you enter the menu, you must input the password correctly, otherwise you can't view and modify the function parameters. Please remember the user password.
If P8-03 is set to 00000, the set user password will be cleared and the password protection function will be invalid.

Parameter	Name	Range
P8-05	Personalized parameter mode selection	Ones bit: 0: No display 1: Display user selected parameters Tens bit: 0: No display 1: Display user modified parameters

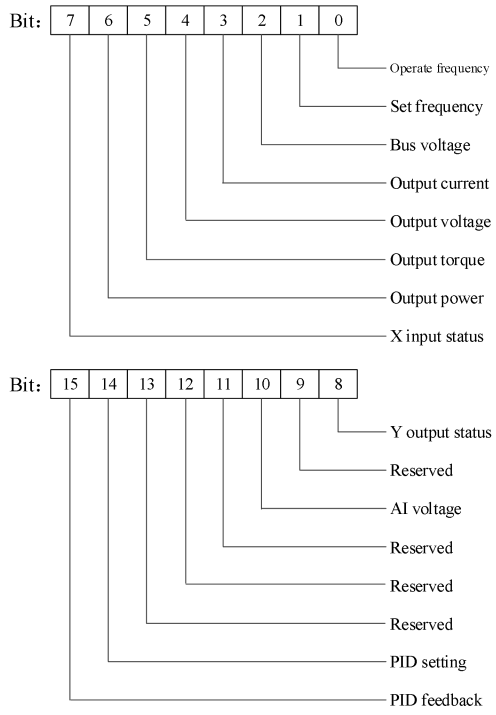
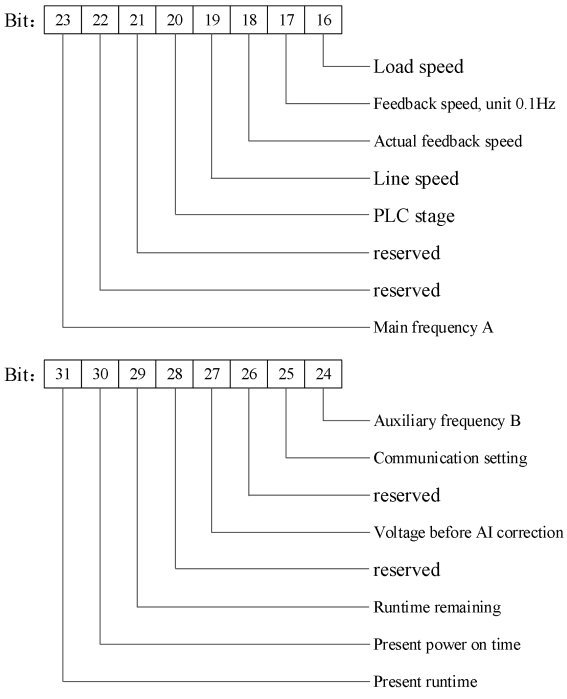
When P8-05=10, press JOG button to enter --C--, check the parameters modified by user.
To return to the parameter adjustment interface, press JOG button, press ENT in the interface where "-- A --" is displayed on the panel.
When P8-05=01, press JOG button to enter --U--, check the parameters defined by user. User can select common parameters through group PE (PE-00~PE-31).
Please refer to chapter 3-1-6 for details.

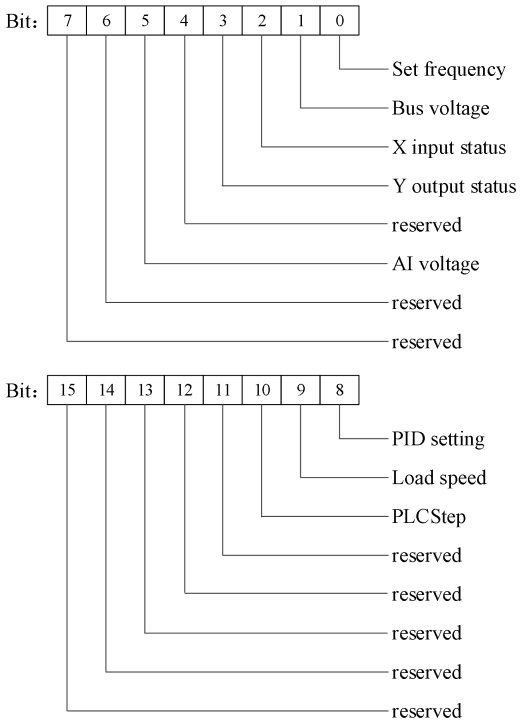
Parameter	Name	Range
P8-06	Parameter modification attribute	0: Modifiable 1: Not modifiable

Users can set whether the function code parameters can be modified to prevent the risk of function parameters being changed by mistake.

If the function code is set to 0, all function codes can be modified. When it is set to 1, all function codes can only be viewed and cannot be modified.

Parameter	Name	Range
P8-07	LED operation display parameter 1	0000 ~ FFFF
P8-08	LED operation display parameter 2	0000 ~ FFFF

P8-07	P8-08
	

Parameter	Name	Range	Description
P8-09	LED shutdown display parameter	0000~FFFF	

In the shutdown or running state, multiple status parameters can be displayed by switching with the key on the operation panel.

There are 24 operation status parameters in operation status. If these parameters need to be displayed, the corresponding bit should be set to 1. After converting this binary number to hexadecimal number, it should be set to P8-07 and P8-08. Similarly, there are 8 shutdown status parameters in shutdown status. If these parameters need to be displayed, set their corresponding bits to 1, and set them to parameter P8-09 after converting binary numbers to hexadecimal.

Parameter	Name	Range
P8-10	Accumulated running time	0~65535h

Display the accumulated running time of inverter. When the running time reaches the set running time PC-32, the multi-function digital output function of inverter outputs ON signal.

Parameter	Name	Range
P8-11	Cumulative power on time	0~65535 h

Display the cumulative power on time of inverter since leaving factory.

When this time reaches the set power on time (PC-30), the multi-function digital output function of inverter outputs ON signal.

Parameter	Name	Range
P8-12	Cumulative power consumption	0~65535 KWh

Display the cumulative power consumption of the inverter so far.

Parameter	Name	Range
P8-13	GP model display	1: type G (Constant torque load model)

		2: type P (Fan and water pump load model)

This parameter is only used by the user to view the factory model, and cannot be changed.

1: It is suitable for constant torque load with specified rated parameters.

2: It is applicable to variable torque load (fan and water pump load) with specified rated parameters.

Parameter	Name	Range
P8-14	Product no.	-
P8-15	Performance version	-
P8-16	Function version	-

Parameter	Name	Range
P8-19	Inverter module radiator temperature	0.0℃~100.0℃

Displays the temperature of IGBT module.

Parameter	Name	Range
P8-20	Output power factor	00.00%~200.00%

When the output power (U0-06) does not correspond to the expected value, the output power can be linearly corrected by this value.

Parameter	Name	Range
P8-21	Load speed display factor	0.0001~6.5000
P8-22	Load speed display decimal position	Ones bit: U0-16 decimal places 0: 0 decimal place 1: 1 decimal place 2: 2 decimal places Tens bit: U0-17 decimal places 1: 1 decimal place 2: 2 decimal places

- Version before 3740

When displaying the load speed, adjust the correspondence between the output frequency of the frequency converter and the load speed through this parameter.

Ones bit:

Used to set the decimal places for displaying load speed, the following examples illustrate the calculation method of load speed:

If the load speed display coefficient P8-21 is 2.0000, and the decimal places of load speed P8-22 are 2 (2 decimal places), when the frequency converter operates at 40.00Hz, the load speed is 40.00 * 2.0000=80.00 (2 decimal places display).

If the frequency converter is in a shutdown state, the load speed is displayed as the speed corresponding to the set frequency, which is the "set load speed". For example, if the frequency is set to 50.00Hz, the load speed in the shutdown state is 50.00 * 2.0000=100.00 (displayed to 2 decimal places).

For example, if the rated speed of the motor is 1500r/min and the rated frequency is 50Hz, and the load speed needs to be displayed, P8-22=11 (factory value), P8-21 needs to be modified to 3.0. At this time, the U0-16 load speed display value is 1500.0.

- Version 3740 and above

When displaying the load speed, adjust the correspondence between the motor speed and the load speed through this parameter.

Ones bit:

Used to set the decimal places for displaying load speed, the following examples illustrate the calculation method of load speed:

If the load speed display coefficient P8-21 is 2.0000, and the decimal place of load speed P8-22 is 2 (2 decimal places), when the motor speed U0-66 is 40RPM, the load speed is 40.00 * 2.0000=80.00 (2 decimal places displayed).

Tens bit:

1: U0-17 and U0-18 are both displayed with one decimal place.

2: U0-17 and U0-18 are both displayed with 2 decimal places.

4-2-10. Group P9 Communication protocol

Parameter	Name	Range
P9-00	Communication protocol	0: Modbus-RTU 1: Communication extension card

When P9-00=0, the communication protocol is Modbus RTU. Please refer to Appendix B for communication introduction.

When P9-00=1, the communication protocol is EtherCAT/CANopen. Please refer to the manual of the corresponding expansion card.

EtherCAT communication expansion card supports 12 groups of PDO, which are: the master station (upper computers) sends data TPDO1~TPDO12, and the mapped function code can be viewed through PE-00~PE-11. The slave station (inverter) responds to data RPDO1~RPDO12, and the mapped function code can be viewed through PE-20~PE-31. Refer to U4 group parameter description for mapping parameter function.

Parameter	Name	Range
P9-01	Local address	1~247, 0 is broadcast address
P9-02	Baud rate	**Ones bit: MODBUS** 0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS (supported by version 3740 and above) 9: 115200BPS (supported by version 3740 and above) **Tens bit: EtherCAT** 0: 115200BPS 1: 208300BPS 2: 256000BPS 3: 512000BPS
P9-03	MODBUS data format 1~4	0: no parity (8-N-2)

		1: even parity (8-E-1) 2: odd parity (8-O-1) 3: no parity (8-N-1)

When P9-00=0, ones bits of P9-02 is valid, and the factory value of P9-02 is 06.

Group P9 parameters are the communication parameters of this model. The necessary conditions for serial communication are communication protocol, local station number, baud rate and data format.

Parameter	Name	Range
P9-04	Communication timeout	0.0 s (Invalid) 0.1 ~ 60.0s

When the function code is set to 0.0 s, the communication timeout parameter is invalid.

When the function code is set to a valid value, if the interval between one communication and the next exceeds the communication timeout, the system will report communication timeout (Err44). Usually, it is set to invalid.

Parameter	Name	Range
P9-05	MODBUS response delay	0~20ms

Response delay: it refers to the interval between the end of data receiving of inverter and the sending of data to upper computer. If the response delay is less than the system processing time, the response delay is subject to the system processing time. If the response delay is longer than the system processing time, the system will wait until the response delay time reached, and then send the data to the upper computer.

Parameter	Name	Range
P9-06	Communication interruption detection of expansion card	0.0s~60.0s

When the function code is set to 0.0s, the expansion card communication interruption detection parameter is invalid.

When the function code is set to valid value, if the communication time between the inverter and the expansion card exceeds the value set by the expansion card communication interruption detection (P9-06), the system will report an error communication timeout (Err44). The default setting is 0.

Parameter	Name	Range
P9-07	VB3/VB5/V5 communication control words (supported by version 3740 and above)	Tens bit: 0: Disable 1: Enable

For the frequency converter using VB series to control the start and stop through modbus-rtu communication, it is necessary to replace the frequency converter with VH5. This function needs to be enabled because the VH5 and VB series inverter control words 2000H and 1100H correspond to different bit functions.

Set the tens bit of the value in P9-07 to 1, enable the VH series frequency converter to replace the function of the modbus communication command control word of VB3/VB5/V5/B5N. Use the VH5 frequency converter to write 2 into 2000H to control the forward operation, write 3 to control the reverse operation, and write 7 to control the deceleration stop.

4-2-11. Group PA PID parameters of process control

Parameter	Name	Range
PA-01	Setting channel selection	0: PA-05 setting 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting 6: Multi-segment command setting
PA-02	Feedback channel selection	0: AI (version 3744 and above) 1: AI (below version 3744) 6: Communication setting

PA-01 is used to select the target given channel of process PID. PA-02 is used to select the feedback channel of process PID.

The setting target value of process PID is relative value, and the setting range is 0.0% ~ 100.0%. Similarly, the feedback quantity of PID is also relative quantity, and the goal of PID is to make the two relative quantities the same.

Parameter	Name	Range
PA-03	PID feedback filter time	0.00s~30.00s
PA-04	PID output filter time	0.00s~30.00s

PA-03 is used to filter the PID feedback, which is helpful to reduce the influence of the disturbance on the feedback, but it will lead to the degradation of the response performance of the process closed-loop system.

PA-04 is used to filter the PID output frequency, which will weaken the mutation of the inverter output frequency, but it will also lead to the degradation of the response performance of the process closed-loop system.

Note: When PA-01 selects 6 (multi segment instruction given), PB-16 (multi segment instruction 0 given method) cannot select 5 (PID given).

Parameter	Name	Range
PA-05	PID value setting	0.0%~100.0%

When PA-01 is set to 0, this parameter needs to set.

Parameter	Name	Range
PA-06	PID setting change time	0.00s~300.00s

The given change time of PID refers to the time required for the given value of PID to change from 0.0% to 100.0%.

When the given value of PID changes, the given value of PID changes linearly according to the given change time to reduce the adverse impact of the given mutation on the system.

Parameter	Name	Range
PA-07	PID reverse cut off frequency	0.00Hz~max output frequency

In some cases, only when the PID output frequency is negative (i.e. inverter reversal), PID can control the quantitative and feedback quantity to the same state, but the high reverse frequency is not allowed for some occasions, and PA-07 is used to determine the upper limit of reverse frequency.

When the frequency source is PID, the frequency output range is as follows:

For example: frequency source is pure PID or main + PID

(1) The reverse cutoff frequency is 0 (PA-07=0) or reverse is forbidden (P0-21=1). Output range: lower frequency to upper frequency (i.e. P0-17~P0-15).
(2) The reverse cut off frequency is not 0 and reverse running is not prohibited (PA-07≠0, P0-21=0). Output range: - reverse cut off frequency ~ upper limit frequency.

Parameter	Name	Range
PA-08	PID deviation limit	0.0%~100.0%

When the deviation between the given quantity and the feedback quantity of PID is less than PA-08, the PID stops adjusting. In this way, the output frequency is stable when the deviation between given and feedback is small, which is very effective for some closed-loop control situations.

Parameter	Name	Range
PA-09	PID differential limiting	0.00%~100.00%

In PID regulator, the function of differential is sensitive and easy to cause system oscillation. Therefore, the function of PID differential is generally limited to a small range. PA-09 is used to set the output range of PID differential.

Parameter	Name	Range
PA-10	Proportional gain P	0.0~1000.0
PA-11	Integral time I	0.01s~10.00s
PA-12	Differential time D	0.000s~10.000s

Proportional gain P:

It determines the regulation intensity of the whole PID regulator. The greater the P is, the greater the regulation intensity is. The parameter 100.0 means that when the deviation between the PID feedback quantity and the given quantity is 100.0%, the adjustment amplitude of the PID regulator to the output frequency command is the maximum frequency.

Integral time I:

Determine the intensity of integral regulation of PID regulator. The shorter the integration time, the greater the adjustment intensity. The integral time means that when the deviation between PID feedback and given quantity is 100.0%, the integral regulator continuously adjusts the time and the adjustment quantity reaches the maximum frequency.

Differential time D:

Determine the strength of PID regulator deviation change rate. The longer the differential time is, the stronger the regulation is. Differential time means that when the feedback value changes by 100.0% in this time, the adjustment value of differential regulator is the maximum frequency.

Parameter	Name	Range
PA-13	PID parameter switching condition	0: Do not switch 1: Switch through X terminal 2:Switch automatically according to deviation 3: Switch automatically according to the operation frequency
PA-14	PID parameter switching deviation 1	0.0%~PA-15
PA-15	PID parameter switching deviation 2	PA-14~100.0%

In some applications, a group of PID parameters can not meet the needs of the whole operation process, so different PID parameters need to be used in different situations. The parameters can be switched through the X

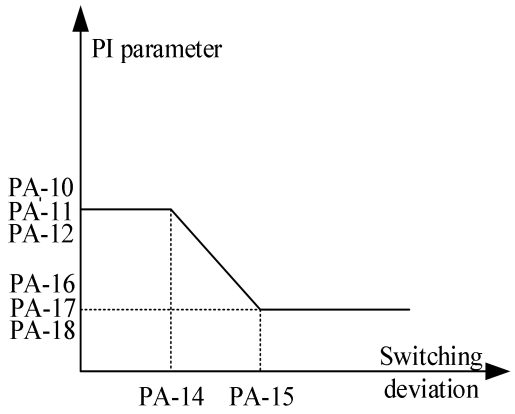
terminal (function 35) of the multi-function terminal, or according to the deviation.

(1) Switch through multi-function terminal X

When switching through the function 35 of the multi-function terminal, the terminal signal OFF corresponds to the first group of PID parameters, and the terminal signal ON corresponds to the second group of PID parameters.

(2) Automatic switching by deviation

When the absolute value of deviation between given and feedback is less than PID parameter switching deviation 1 (PA-14), the first group of PID parameters is selected for PID parameters. When the absolute value of deviation between given and feedback is greater than PID switching deviation 2 (PA-15), the second group of PID parameters is selected. When the deviation between given and feedback is between switching deviation 1 and switching deviation 2, PID parameters are linear interpolation values of two groups of PID parameters, as shown in the figure below.



Parameter	Name	Range
PA-16	PID proportional gain P2	0.0~100.0
PA-17	PID integral time I2	0.01s~10.00s
PA-18	PID differential time D2	0.000s~10.000s

Same to PA-10~PA-12, the second set of PID parameters.

Parameter	Name	Range
PA-19	PID action direction	0: positive action 1: negative action

Positive action: when the feedback signal of PID is less than the given quantity, the output frequency of inverter rises. Such as winding tension control occasions.

Negative action: when the feedback signal of PID is less than the given quantity, the output frequency of inverter decreases. Such as unwinding tension control occasions.

The function is affected by the reverse action direction of the multi-function terminal PID, which needs attention in use.

Parameter	Name	Range
PA-20	PID given feedback range	0~65535

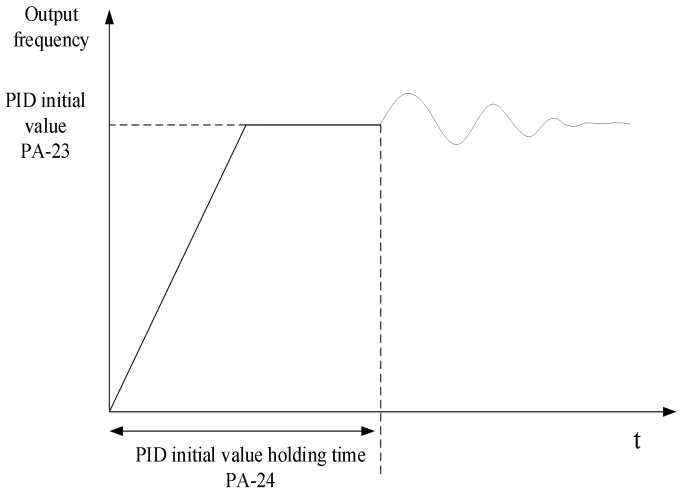
PID given feedback range is a dimensionless unit, used for PID given display U0-14 and PID feedback display U0-15.

The relative value of the given feedback of PID is 100.0%, corresponding to the given feedback range PA-20.

For example, if PA-20 is set to 2000, when PID is given 100.0%, U0-14 is 2000.

Parameter	Name	Range
PA-21	PID maximum deviation between two outputs	0.00%~100.00%
PA-22	PID minimum deviation between two outputs	0.00%~100.00%
PA-23	PID initial value	0.0%~100.0%
PA-24	PID initial value holding time	0.00s~600.00s

When the VFD is started, PID output is fixed to PID initial value PA-23, and PID does not start closed-loop adjustment operation until the initial value of PID is maintained for PA-24. The following figure shows the function diagram of the initial PID value.



Parameter	Name	Range
PA-25	PID operation mode (whether to operate when shutdown)	0: Not operate when shutdown 1: Operate when shutdown

It is used to select whether the PID continues to calculate in PID shutdown state. In general application, PID should stop operation in shutdown state.

Parameter	Name	Range
PA-26	PID integral attribute	Ones bit: integral separation 0: invalid 1: valid Tens bit: whether to stop integration after output to limit value 0: continue to integral 1: Stop integral

Integral separation:

If the integral separation is set to be effective, when the X terminal integral pause (function 34) is effective, the integral of PID stops operation, and at this time, only the proportional and differential functions of PID are effective.

When the integral separation is invalid, the integral separation is invalid no matter whether the multi-function digital DI is valid or not.

Whether to stop integration after output reached limit value:

After the PID operation output reaches the maximum or minimum value, you can choose whether to stop the integral action. If stop integral is selected, PID integral calculation will stop at this time, which may help to reduce PID overshoot.

Parameter	Name	Range
PA-27	PID feedback lost detection value	0.0%: not judge the feedback lost 0.1%~100.0%
PA-28	PID feedback lost detection time	0.0s~30.0s

This function code is used to judge whether PID feedback is lost.

When the PID feedback value is less than the feedback loss detection value PA-27 and the duration time exceeds the PID feedback loss detection time PA-28, the VFD will alarm the fault Err50.

4-2-12. Group PB Multi-speed and simple PLC

Parameter	Name	Range
PB-00	Multi-segment command 0	-100.0% ~ +100.0%
PB-01	Multi-segment command 1	-100.0% ~ +100.0%
PB-02	Multi-segment command 2	-100.0% ~ +100.0%
PB-03	Multi-segment command 3	-100.0% ~ +100.0%
PB-04	Multi-segment command 4	-100.0% ~ +100.0%
PB-05	Multi-segment command 5	-100.0% ~ +100.0%
PB-06	Multi-segment command 6	-100.0% ~ +100.0%
PB-07	Multi-segment command 7	-100.0% ~ +100.0%
PB-08	Multi-segment command 8	-100.0% ~ +100.0%
PB-09	Multi-segment command 9	-100.0% ~ +100.0%
PB-10	Multi-segment command 10	-100.0% ~ +100.0%
PB-11	Multi-segment command 11	-100.0% ~ +100.0%
PB-12	Multi-segment command 12	-100.0% ~ +100.0%
PB-13	Multi-segment command 13	-100.0% ~ +100.0%
PB-14	Multi-segment command 14	-100.0% ~ +100.0%
PB-15	Multi-segment command 15	-100.0% ~ +100.0%
PB-16	Multi-segment 0 command setting mode	0: PB-00 setting 1: AI (version 3744 and above) 2: AI (below version 3744) 5: PID setting 6: preset frequency P0-10

According to the different states of multi-function digital X, the multi-segment instruction needs to be switched and selected. For details, please refer to the relevant instructions of group P2.

Parameter	Name	Range
PB-17	Simple PLC segment 0 operation time	0.0~6500.0s(h)
PB-18	Simple PLC segment 0 acc/dec time	0~3
PB-19	Simple PLC segment 1 operation time	0.0~6500.0s(h)
PB-20	Simple PLC segment 1 acc/dec time	0~3
PB-21	Simple PLC segment 2 operation time	0.0~6500.0s(h)
PB-22	Simple PLC segment 2 acc/dec time	0~3
PB-23	Simple PLC segment 3 operation time	0.0~6500.0s(h)
PB-24	Simple PLC segment 3 acc/dec time	0~3

Parameter	Name	Range
PB-25	Simple PLC segment 4 operation time	0.0~6500.0s(h)
PB-26	Simple PLC segment 4 acc/dec time	0~3
PB-27	Simple PLC segment 5 operation time	0.0~6500.0s(h)
PB-28	Simple PLC segment 5 acc/dec time	0~3
PB-29	Simple PLC segment 6 operation time	0.0~6500.0s(h)
PB-30	Simple PLC segment 6 acc/dec time	0~3
PB-31	Simple PLC segment 7 operation time	0.0~6500.0s(h)
PB-32	Simple PLC segment 7 acc/dec time	0~3
PB-33	Simple PLC segment 8 operation time	0.0~6500.0s(h)
PB-34	Simple PLC segment 8 acc/dec time	0~3
PB-35	Simple PLC segment 9 operation time	0.0~6500.0s(h)
PB-36	Simple PLC segment 9 acc/dec time	0~3
PB-37	Simple PLC segment 10 operation time	0.0~6500.0s(h)
PB-38	Simple PLC segment 10 acc/dec time	0~3
PB-39	Simple PLC segment 11 operation time	0.0~6500.0s(h)
PB-40	Simple PLC segment 11 acc/dec time	0~3
PB-41	Simple PLC segment 12 operation time	0.0~6500.0s(h)
PB-42	Simple PLC segment 12 acc/dec time	0~3
PB-43	Simple PLC segment 13 operation time	0.0~6500.0s(h)
PB-44	Simple PLC segment 13 acc/dec time	0~3
PB-45	Simple PLC segment 14 operation time	0.0~6500.0s(h)
PB-46	Simple PLC segment 14 acc/dec time	0~3
PB-47	Simple PLC segment 15 operation time	0.0~6500.0s(h)
PB-48	Simple PLC segment 15 acc/dec time	0~3
PB-49	Simple PLC operation mode	0: Stop at the end of single operation 1: Keep the final value at the end of single operation 2: Cycle all the time

Simple PLC function has two functions: as frequency source or as voltage source of VF separation.

When simple PLC is used as frequency source, the positive and negative values of PB-00 ~ PB-15 determine the operation direction. If the value is negative, it means that the inverter runs in the opposite direction.

As frequency source, PLC has three operation modes, but as VF voltage source, it has no such mode.

Among them:

0: Stop at the end of single operation

The inverter stops automatically after completing a single cycle and needs to give the operation command again to start.

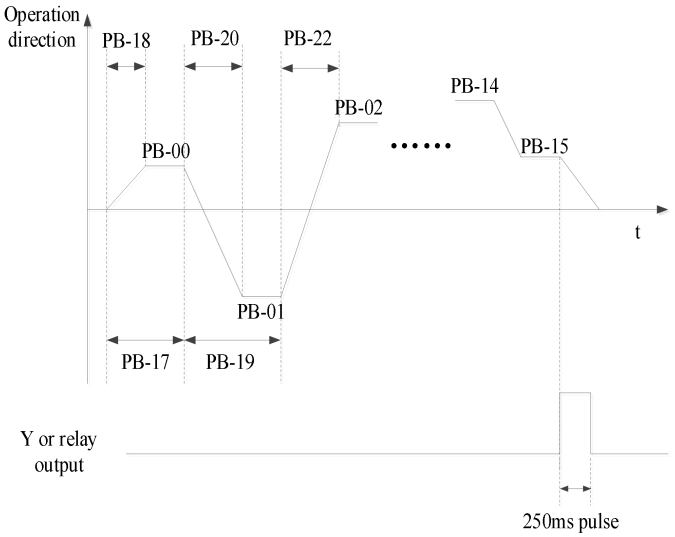
1: Keep the final value at the end of single operation

After completing a single cycle, the frequency and direction of the last section will be maintained automatically.

2: Cycle all the time

After the inverter completes one cycle, it will start the next cycle automatically until there is a stop command.

The figure below is the schematic diagram of simple PLC as frequency source. When simple PLC is used as frequency source, the positive and negative values of PB-00 ~ PB-15 determine the operation direction. If the value is negative, it means that the inverter runs in the opposite direction.



Parameter	Name	Range
PB-50	Simple PLC operation time unit	0: second 1: hour
PB-51	Simple PLC power-off memory selection	Ones bit: power-off memory 0: not memory 1: memory Tens bit: stop memory 0: not memory 1: memory

PLC power down memory refers to memorizing the operation stage and frequency of PLC before power down, and continuing to run from the memory stage when next power on. If no memory is selected, the PLC process will be restarted every time when the power is on.

PLC shutdown memory is to record the previous PLC operation stage and frequency during shutdown, and continue to run from the memory stage during the next operation. If no memory is selected, the PLC process will be restarted every time.

4-2-13. Group PC Auxiliary function

Parameter	Name	Range
PC-00	Jog frequency	0.00Hz~ max output frequency P0-13
PC-01	Jog acceleration time	0.0s~6500.0s
PC-02	Jog deceleration time	0.0s~6500.0s

Define the given frequency and acceleration and deceleration time of inverter when jogging.

During jog operation, the start mode is fixed as direct start mode (P4-00 = 0), and the stop mode is fixed as deceleration stop mode (P4-22 = 0).

Parameter	Name	Range
PC-03	Acceleration time 2	0. 1s~6500.0s
PC-04	Deceleration time 2	0. 1s~6500.0s
PC-05	Acceleration time 3	0. 1s~6500.0s
PC-06	Deceleration time 3	0. 1s~6500.0s
PC-07	Acceleration time 4	0. 1s~6500.0s

PC-08	Deceleration time 4	0. 1s~6500.0s

VH5 provided four groups of acceleration and deceleration time, which are P0-18/P0-19 and above parameters.

Parameter	Name	Range
PC-09	The unit of Acc/Dec time	0: 1s 1: 0.1s 2: 0.01s

PC-09 is used to set the unit of acceleration and deceleration time for four groups.

Parameter	Name	Range
PC-10	The base frequency of Acc/Dec time	0: Max frequency 1: Setting frequency 2: 100Hz

The acceleration and deceleration time is the time accelerating from 0 to the frequency set by PC-10. If PC-10 is 1, the acceleration of the motor changes.

Parameter	Name	Range
PC-11	Switching frequency point between acceleration time 1 and acceleration time 2	0.00Hz~max frequency
PC-12	Switching frequency point between deceleration time 1 and deceleration time 2	0.00Hz~ max frequency

When controlling motor 1, you can choose different acceleration and deceleration time.

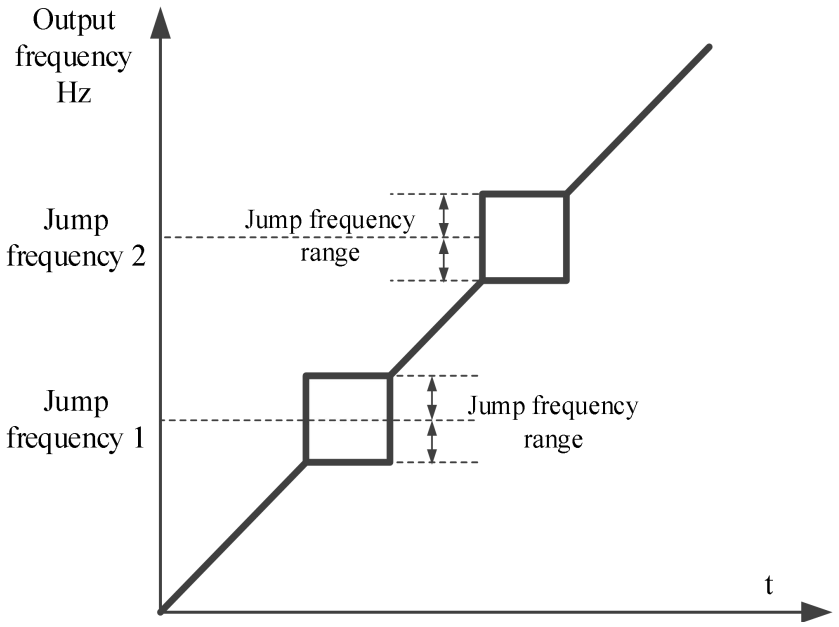
Note: when using this function, the multi-function terminal function cannot select the acceleration and deceleration time switching.

Parameter	Name	Range
PC-13	Jump frequency 1	0.00Hz~max frequency
PC-14	Jump frequency 2	0.00Hz~max frequency
PC-15	Jump frequency range	0.00Hz~max frequency

When the set frequency is within the range of jumping frequency, the actual running frequency will run at the jumping frequency close to the set frequency. By setting the jumping frequency, the inverter can avoid the mechanical resonance point of the load.

VH5 can set two jump frequency points. If both jump frequencies are set to 0, the jump frequency function will be cancelled.

Please refer to the figure below for the principle of jump frequency and jump frequency amplitude.



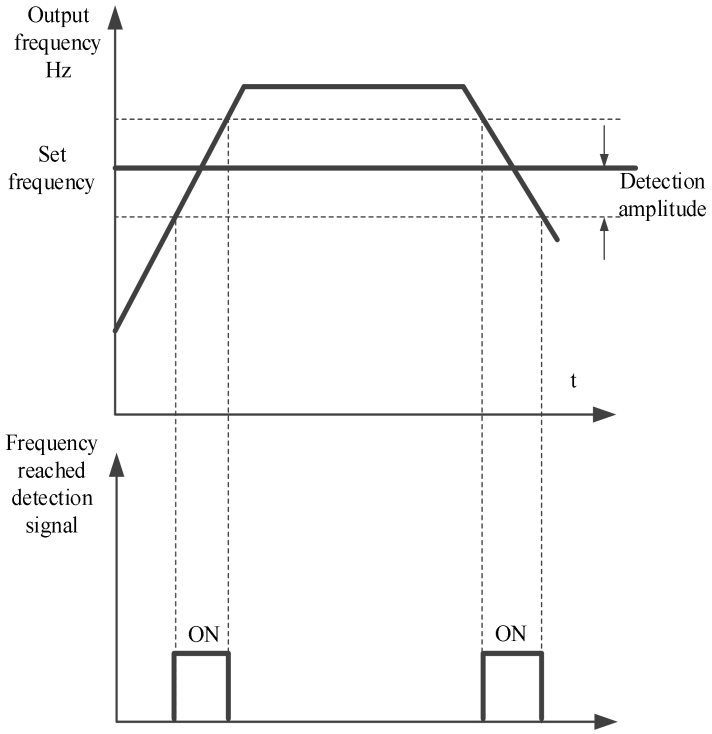
Parameter	Name	Range
PC-16	Whether the jump frequency is effective during acceleration and deceleration	0: Invalid 1: Valid (in vector condition)

Set whether the jump frequency is effective during acceleration and deceleration.

Parameter	Name	Range
PC-17	The frequency reached detection range	0.0~100% (Max frequency)

When the operation frequency of the inverter is in a certain range of the target frequency, the multi-function Y terminal of the inverter outputs ON signal.

This parameter is used to set the detection range of frequency, which is the percentage relative to the maximum frequency. The figure below is the schematic diagram of frequency arrival.



Parameter	Name	Range
PC-18	Frequency detection value (FDT1 voltage level)	0.00Hz~max frequency
PC-19	Frequency detection hysteresis value (FDT1 voltage level)	0.0%~100.0% (FDT1 voltage level)

When the operating frequency is higher than the frequency detection value, the inverter multi-function output Y outputs ON signal, and when the frequency is lower than the detection value, the Y terminal output ON signal is cancelled.

The above parameters are used to set the detection value of output frequency and the hysteresis value of output action release. Where PC-19 is the percentage of the hysteresis frequency relative to the frequency detection value PC-18.

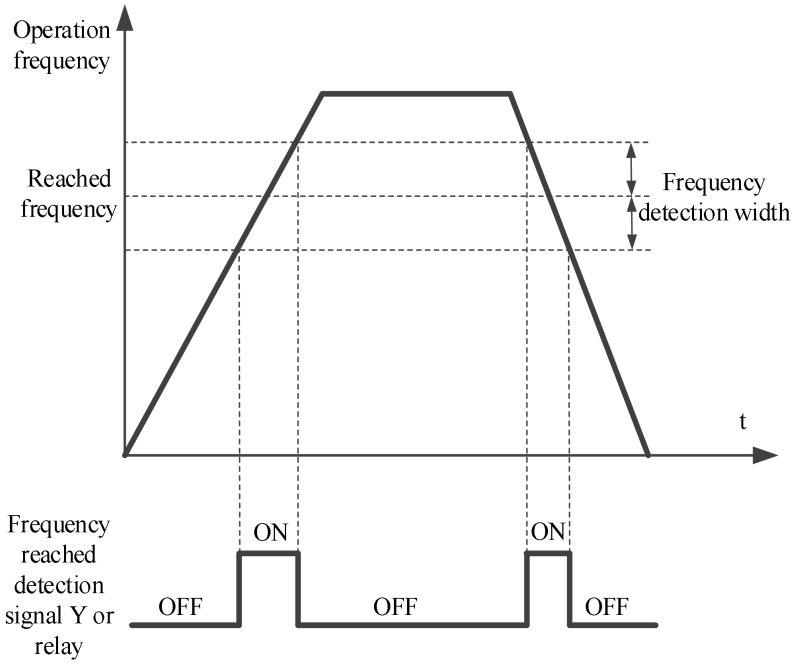
Parameter	Name	Range
PC-20	Frequency detection value (FDT2 voltage level)	0.00Hz~Max frequency
PC-21	Frequency detection hysteresis value (FDT2 voltage level)	0.0%~100.0% (Max output frequency)

The frequency detection function is the same as that of FDT1. Please refer to the relevant description of function code PC-18 and PC-19.

Parameter	Name	Range
PC-22	Frequency reached detection value 1	0.00Hz~ max output frequency
PC-23	Frequency reached detection 1 range	0.0%~100.0% (Max output frequency)
PC-24	Frequency reached detection value 2	0.00Hz~ max output frequency
PC-25	Frequency reached detection 2 range	0.0%~100.0% (Max output frequency)

When the output frequency of the inverter is within the positive and negative detection range of frequency detection value, the multi-function Y outputs the ON signal.

VH5 provides two groups of frequency reached detection parameters, setting frequency value and frequency detection range respectively. The figure below is the schematic diagram of this function.



Parameter	Name	Range
PC-26	Timing function selection	0: invalid 1: Valid
PC-28	Setting operation time	0.0Min~6500.0Min
PC-29	Present operation reached time	0.0Min~6500.0Min

When PC-26 = 1, the timing function is turned on, the current running time U0-31 is greater than the value set by PC-28, the inverter stops running, and Y outputs ON signal by assigning function code 26 to Y terminal.

The value of current time U0-31 is greater than the value set by PC-29. By assigning function code 41 to Y terminal, Y outputs ON signal, but the inverter will not stop running.

Parameter	Name	Range
PC-30	Setting power on reached time	0~65000h
PC-32	Setting operation reached time	0~65000h

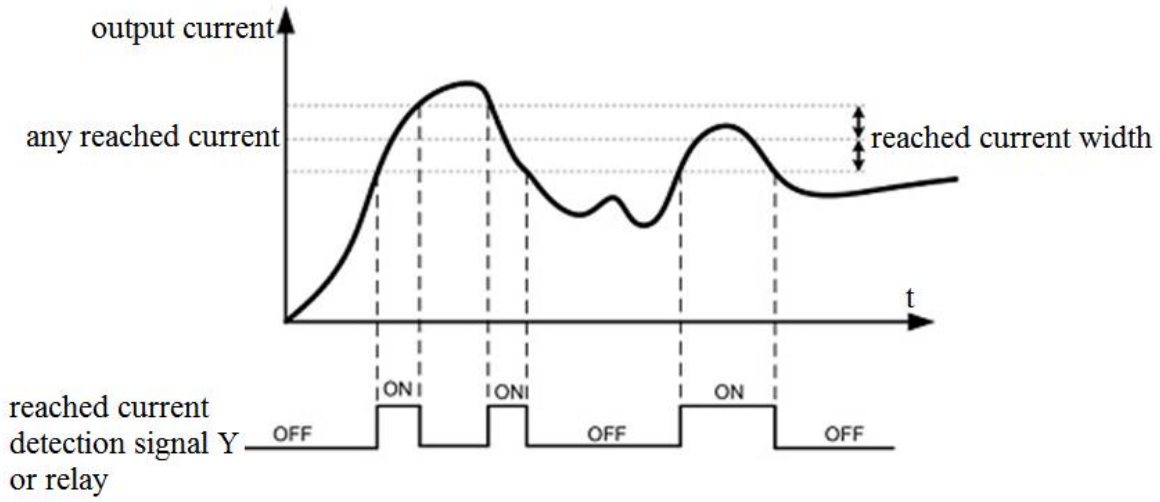
When the accumulated operation time of P8-10 is greater than the set operation arrival time of PC-32, the inverter will stop operation. By assigning function code 29 to the Y terminal, the Y terminal will output ON signal.

When the cumulative power on time of P8-11 is greater than the power on arrival time set by PC-30, the inverter will stop running. By assigning function code 25 to the Y terminal, the Y terminal will output ON signal.

Parameter	Name	Range
PC-34	Current reached detection value 1	0.0%~300.0% (motor rated current)
PC-35	Current reached detection 1 range	0.0%~300.0% (motor rated current)
PC-36	Current reached detection value 2	0.0%~300.0% (motor rated current)
PC-37	Current reached detection 2 range	0.0%~300.0% (motor rated current)

When the output current of the inverter is within the set positive and negative detection width of current arrival, the multi-function Y outputs ON signal.

VH5 provides two groups of arrival current and detection width parameters. The following figure is the function diagram.



Parameter	Name	Range
PC-38	Zero current detection value	0.0%~300.0% (motor rated current)
PC-39	Zero current detection delay time	0.00s~600.00s

When the output current of the inverter is less than or equal to the zero current detection level and the duration exceeds the zero current detection delay time, the Y terminal of the inverter outputs ON signal.

Parameter	Name	Range
PC-40	Software overcurrent point	0.0% (not detect) 0.1%~300.0% (motor rated current)
PC-41	Software overcurrent detection delay time	0.00s~600.00s

When the output current of the inverter is greater than or exceeds the limit detection point, and the duration exceeds the software over-current point detection delay time, the Y terminal of the inverter outputs ON signal.

Parameter	Name	Range
PC-42	AI input voltage lower limit	0.00V~PC-43
PC-43	AI input voltage upper limit	PC-42~10.50V

When the value of analog input AI is greater than PC-43, or AI1 input is less than PC-42, Y terminal of inverter outputs "AI input overrun" ON signal, which is used to indicate whether the input voltage of AI is within the set range (supported by version 3744 and above).

Parameter	Name	Range
PC-44	Over voltage point	540~810V (380V models) 200~400V (220 models)

It is used to set the voltage value of inverter overvoltage fault. The factory value of 380V voltage level inverter overvoltage point is 810V, and the factory value of 220V voltage level inverter overvoltage point is 400V.

Parameter	Name	Range
PC-45	Under voltage point	200~537V (380V models) 200~400V (220 models)

It is used to set the voltage value of inverter under voltage fault Err08 fault. The factory default value is 200V.

Parameter	Name	Range
PC-46	Operation action when the frequency is lower than lower limit frequency	0: Run at lower limit frequency 1: Stop 2: Run at zero speed

Parameter	Name	Range
PC-47	Module temperature reached	0~100℃

When the inverter radiator temperature reaches the temperature, the inverter Y terminal outputs the "module temperature reaches" ON signal.

Parameter	Name	Range
PC-48	Fan control	0: The fan runs during operation 1: The fan is running all the time

It is used to select the action mode of the cooling fan. When 0 is selected, the fan runs in the running state of the inverter. When the radiator temperature is higher than 40℃, the fan runs. When the radiator temperature is lower than 40 ℃, the fan does not run.

When it is selected as 1, the fan will run after power on.

Parameter	Name	Range
PC-49	Droop control	0.00Hz~10.00Hz

The droop rate allows a small speed difference between the master station and the slave station, thus avoiding conflicts between them. The default value for this parameter is 0.

Only when the master and slave adopt the speed control mode, the droop rate needs to be adjusted. For each transmission process, the appropriate droop rate needs to be gradually found in practice. It is suggested that the PC-49 should not be set too large, otherwise the steady-state speed will drop obviously when the load is large. The droop rate must be set for both the master and slave.

Droop speed = Synchronization frequency × output torque × droop rate ÷ 10

Eg.: PC-49 = 1.00, Synchronization frequency=50Hz, output torque=50%, then

Droop speed = 50Hz×50%×1.00÷10=2.5Hz

VFD actual frequency = 50Hz – 2.5Hz = 47.5Hz

Parameter	Name	Range
PC-50	Terminal jog run priority	0: invalid 1: valid

This parameter is used to set whether the terminal jog function has the highest priority.

When the terminal jog priority is effective, if the terminal jog command appears in the operation process, the inverter will switch to the terminal jog operation state.

Parameter	Name	Range
PC-51	SVC optimization selection	1: Optimization mode 1 2: Optimization mode 2

The SVC optimization mode of asynchronous motor, it does not need to be adjusted generally.

Parameter	Name	Range
PC-52	Dead area compensation mode	0: No compensation 1: Compensation mode 1

Parameter	Name	Range
PC-54	Modulation mode	0: Asynchronous Modulation 1: Synchronous modulation

It is only effective for VF control.

Synchronous modulation means that the carrier frequency changes linearly with the output frequency transformation to ensure that the ratio (carrier wave ratio) remains unchanged. It is generally used when the output frequency is higher, which is conducive to the quality of output voltage. When the output frequency is lower (below 100Hz), generally synchronous modulation is not needed, because the ratio of carrier frequency to output frequency is higher, and the advantage of asynchronous modulation is more obvious.

When the operating frequency is higher than 85Hz, the synchronous modulation will take effect, and the asynchronous modulation mode is adopted below this frequency.

Parameter	Name	Range
PC-55	DPWM switching upper limit frequency	5.00Hz~max output frequency

It is only effective for VF control. Generally, it does not need to be modified.

The modulation mode of asynchronous motor is determined by the VF wave generation mode. When the value is lower than PC-55, the switching loss of inverter is large, but the current ripple is small. When it is larger than PC-55, it is opposite, but it is easy to cause unstable operation of motor at high frequency.

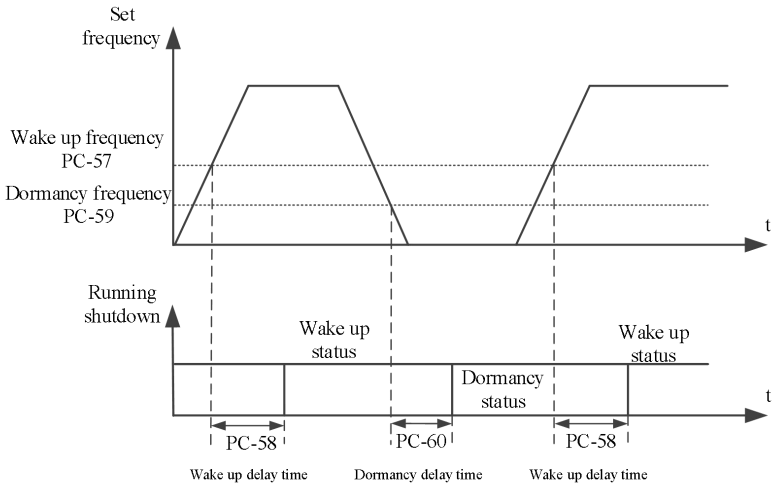
When VF control operation is unstable, please refer to parameter P5-17. For inverter loss and temperature rise, please refer to PC-67.

Parameter	Name	Range
PC-56	Random PWM depth	0: Random PWM invalid 1~10: PWM carrier frequency random depth

When the random PWM depth is set to 0, the random PWM is invalid.

By adjusting the random PWM depth, the monotonous and harsh sound of the motor can be softened and the external electromagnetic interference can be reduced.

Parameter	Name	Range
PC-57	Wake up frequency	Dormancy frequency PC-59~max output frequency P0-13
PC-58	Wake up delay time	0.0s~6500.0s
PC-59	Dormancy frequency	0.00Hz~wake up frequency PC-57
PC-60	Dormancy delay time	0.0s~6500.0s



This set of parameters is used to realize the dormancy and wake-up function in water supply application.

During the operation of the inverter, when the set frequency is less than or equal to Dormancy frequency (PC-59), after the delay time(PC-60), the inverter enters the dormancy state and stops automatically.

If the inverter is in dormancy state and the current operation command is valid, when the set frequency is greater than or equal to the wake-up frequency(PC-57), the inverter starts to restart after the Wake up delay time(PC-58).

In general, please set the wake-up frequency to be greater than or equal to the dormancy frequency. Set the wake-up frequency and dormancy frequency to 0.00Hz, then the dormancy and wake-up functions are invalid.

Note: when the dormancy function is enabled, if the frequency source uses PID, it is necessary to select the

operation when the PID stops (PA-25 = 1).

Parameter	Name	Range
PC-61	Wave by wave current limiting enable	0: Not enable 1: Enable

The fast current limiting function can minimize the over-current fault of the inverter and ensure the uninterrupted operation of the inverter.

If the inverter is in the fast current limiting state for a long time, the inverter may be damaged by overheating, which is not allowed. Therefore, when the inverter is in the fast current limiting state for a long time, it will give an alarm, indicating that the inverter is overloaded and needs to be shut down.

Parameter	Name	Range
PC-62	Current detection compensation	0~100

It is used to set the current detection compensation of inverter. If the setting is too large, the control performance may be degraded. Generally, it does not need to be modified.

Parameter	Name	Range
PC-65	Bus voltage reached value	Unit: 0.1V
PC-66	The bus voltage reached hysteresis value	Unit: 0.1V

When the bus voltage reaches (PC-65-PC-66~PC-65+PC66), the Y terminal outputs ON signal by assigning function code 42 to Y terminal.

Parameter	Name	Range
PC-67	Carrier frequency	0.5K~16.0K

By adjusting the carrier frequency of the inverter, the noise of the motor can be reduced, the resonance point of the mechanical system can be avoided, the line leakage current to the ground and the interference of the inverter can be reduced. When the carrier frequency is high, the motor loss and the motor temperature rising decrease, but the inverter loss increases, the inverter temperature rising increases, and the interference increases.

If the carrier frequency is set higher than the factory value, the temperature rising of the inverter radiator will be increased. At this time, the user needs to use the inverter derating.

Parameter	Name	Range	
PC-68	The carrier frequency is adjusted with temperature	0	No
		1	Yes

When PC-68 is 0, the carrier of inverter is determined by the set value and will not change during operation.

When PC-68 is 1, when the operating process of the inverter detects that the temperature of its radiator is high, the carrier frequency will be automatically reduced to reduce the temperature rising of the converter. When the temperature of the radiator is detected to be low, the carrier frequency will automatically return to the set value.

Parameter	Name	Range
PC-69	Frequency converter temperature protection alarm threshold	Reserved
PC-72	External linear speed given source (supported by version 3720 and above)	0:Do not use external linear speed 1: AI (version 3744 and above) 2: AI (belowe version 3744)

		5: Communication
PC-73	Maximum allowable update deviation of main frequency (supported by 3720 and above)	0.00%～10.00%
PC-74	Allowed update interval of main frequency (supported by 3720 and above)	0.00s~200.00s
PC-75	Differential time of external linear speed change (supported by 3720 and above)	0.00s~50.00s

When P0-03: main frequency source A is selected and set to 10: wire drawing and winding special mode, P0-04: auxiliary frequency is adjusted by PID and set to 8; P0-05 set to 01, the frequency converter will use the main frequency+auxiliary frequency method to control the winding.

The control mode is as follows:

The main frequency is roughly adjusted, the update interval and size of the main frequency are controlled by function codes PC-73 to PC-74. The auxiliary frequency is precisely regulated by PID.

Final output frequency=Main frequency+Auxiliary frequency.

If the external linear speed changes too much (judged by function codes PC-75~PC-76), the auxiliary frequency will no longer be effective, and the main frequency will directly control the winding in a form of synchronous changes with the linear speed in a certain proportion (suitable for control during acceleration and deceleration stages).

PC-73: It means that when the deviation between PID setting and feedback is less than the deviation set by PC-73, the main frequency will be allowed to be updated.

PC-74: When the deviation between PID given and feedback is less than the deviation set by PC-73, the main frequency is updated every PC-74 time interval.

PC-75~PC-76: to determine the change in external wire speed. PC-72 is set to 0 to not determine whether the external wire speed has changed, and a non-0 value is used to select the external wire speed given source.

PC-75: Unit time of external linear speed change.

PC-76: change of external linear speed in unit time, unit: 0.01Hz. If the external linear speed change is greater than the value set by PC-76, the auxiliary frequency will not work, and the main frequency will change synchronously with the linear speed in a certain proportion.

The current frequency change can be viewed through the U0-23 main frequency A display and the U0-24 auxiliary frequency B display. When the feedback value is equal to the target frequency, U0-23 is the same as the current operating frequency of the frequency converter, and U0-24 is 0. When the feedback value is less than the target frequency, the U0-23 value remains unchanged and U0-24 increases; When the feedback value is greater than the target frequency, the U0-23 value remains unchanged and the U0-24 value decreases.

4-2-14. Group PE User optional parameters

Parameter	Name	Range
PE-00	User optional parameters 0	
PE-01	User optional parameters 1	
PE-02	User optional parameters 2	
PE-03	User optional parameters 3	
PE-04	User optional parameters 4	
PE-05	User optional parameters 5	

Parameter	Name	Range
PE-06	User optional parameters 6	P0.00 ~ PF.xx A0.00 ~ A2.xx A9.00 ~ Ad.xx U0.00 ~ U0.xx U4.00 ~ U5.xx
PE-07	User optional parameters 7	
PE-08	User optional parameters 8	
PE-09	User optional parameters 9	
PE-10	User optional parameters 10	
PE-11	User optional parameters 11	
PE-12	User optional parameters 12	
PE-13	User optional parameters 13	
PE-14	User optional parameters 14	
PE-15	User optional parameters 15	
PE-16	User optional parameters 16	
PE-17	User optional parameters 17	
PE-18	User optional parameters 18	
PE-19	User optional parameters 19	
PE-20	User optional parameters 20	
PE-21	User optional parameters 21	
PE-22	User optional parameters 22	
PE-23	User optional parameters 23	
PE-24	User optional parameters 24	
PE-25	User optional parameters 25	
PE-26	User optional parameters 26	
PE-27	User optional parameters 27	
PE-28	User optional parameters 28	
PE-29	User optional parameters 29	
PE-30	User optional parameters 30	
PE-31	User optional parameters 31	

This group of function codes is the user-defined parameter group (When using, set P8-00= 0 and P8-05=11). Users can select the required parameters into PE group in VH5, which can be used as user-defined parameters to facilitate the operation of viewing and changing.

Group PE provides up to 32 user-defined parameters. When entering user-defined parameter mode, the display function code is defined by PE-00~PE-31, and the sequence is consistent with group PE function code.

This parameter array can map some discontinuous parameters into PE parameters. When the upper computer PLC reads the parameters of the converter, it can read all the discontinuous parameters through one instruction, which can simplify the PLC communication instruction and improve the communication efficiency.

4-2-15. Group PF Torque control (Firmware versions below 3720)

Parameter	Name	Range
PF-00	Torque control	0: Speed control 1: Torque control

It is used to select the control mode of inverter: speed control or torque control, which cannot be switched during the operation.

The X terminal of VH5 has a function related to torque control: torque control inhibition (function 29).

When the speed control / torque control switching terminal is invalid, the control mode is determined by PF-00. If the speed control / torque control switching is effective, the control mode is equivalent to the reverse value of PF-00.

Note: Torque mode is only valid in vector control mode.

Parameter	Name	Range
PF-01	Upper limit source of driver torque	0: Digital setting 2: AI 5: Communication setting (the full scale of option 0,2,5 correspond to PF-02 digital setting)
PF-02	Driver torque upper limit	-200.0%~200.0%

PF-01 is used to select the torque setting source. There are three torque setting modes.

The torque setting adopts relative value, and 100.0% corresponds to the rated torque of the motor. The setting range is - 200.0% ~ 200.0%, indicating that the maximum torque of the inverter is twice the rated torque of the inverter.

When the torque is set to be positive, the inverter runs forward.

When the torque is set to be negative, the inverter runs reverse.

The torque setting sources are described as follows:

0: Digital setting (PF-02)

The target torque directly uses the PF-02 setting value.

2: AI

When AI is used as the frequency setting, voltage/current input correspond to 100.0% of the setting.It refers to the percentage of relative torque digital setting PF-02.The input voltage values of AI and the corresponding relationship curve with the target torque can be freely selected by the user through P2-54.

VH5 provides 5 groups corresponding relationship curves, among which 3 groups of curves are linear relationship (2-point corresponding relationship), and 2 groups of curves are broken lines of 4-point corresponding relationship. Users can set them through P2 group.

5: Communication setting

The target torque is given by the communication mode.

When MODBUS is used for communication, the data is given by the host computer through the communication address **H1000**, and the data format is data with 2 decimal places.

For reverse operation, users can set PF-02 as the negative value or write a negative value into H1000.

Parameter	Name	Range
PF-03	Torque control forward direction max frequency	0.00Hz~max output frequency
PF-04	Torque control reverse direction max frequency	0.00Hz~ max output frequency

It is used to set the forward or reverse maximum operating frequency of inverter under torque control mode. The acceleration and deceleration time of upper frequency limit is set in PC-07 (acceleration) / PC-08 (deceleration).

When the inverter in torque control, if the load torque is less than the motor output torque, the motor speed will

continue to rise, in order to prevent the mechanical system from galloping accidents, we must limit the maximum speed of the motor in torque control.
If the maximum frequency of torque control needs to be dynamically changed continuously, it can be realized by controlling the upper limit frequency.

Parameter	Name	Range
PF-05	Torque acceleration time	0.00s~650.00s
PF-06	Torque deceleration time	0.00s~650.00s

Under torque control mode, the difference between the output torque and the load torque determines the speed change rate of the motor and the load. The motor speed may change rapidly, causing noise or mechanical stress too much. By setting the torque control acceleration and deceleration time, the motor speed can change smoothly.
In the torque control of small torque starting, it is not recommended to set the torque acceleration and deceleration time. If the torque acceleration and deceleration time is set, it is suggested to increase the speed filter coefficient properly. When torque quick response is needed, torque control acceleration and deceleration time is set to 0.00s.

For example, two motors in hard connection drive the same load. In order to ensure the load distribution evenly, one inverter is set as the master, and the speed control mode is adopted, the other is slave and torque control is adopted. The actual output torque of the host is the torque command of the slave. At this time, the torque of the slave needs to follow the master quickly, then the acceleration and deceleration time of torque control of slave is 0.00s.

4-2-16. Group PF Torque control (Firmware versions 3720 and above)

Parameter	Name	Range
PF-00	Torque control	0: Speed control 1: Torque control

It is used to select the control mode of inverter: speed control or torque control, which cannot be switched during the operation of inverter.
The X terminal of VH5 has a function related to torque control: torque control inhibition (function 29).
When the speed control / torque control switching terminal is invalid, the control mode is determined by PF-00.
If the speed control / torque control switching is effective, the control mode is equivalent to the reverse value of PF-00.

Parameter	Name	Range
PF-01	Upper limit source of driver torque	0: Digital setting 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting (the full scale of option 0, 1, 2, 5 correspond to PF-02 digital setting)
PF-02	Driver torque upper limit	-200.0%~200.0%

PF-01 is used to select the torque setting source, and there are 3 torque setting methods.
The torque setting adopts relative value, and 100.0% corresponds to the rated torque of the motor. The setting

range is -200.0% - 200.0%, indicating that the maximum torque of the inverter is twice the rated torque of the inverter.

When the torque is given as positive, the inverter operates in positive.

When the torque is given as negative, the inverter operates in reverse.

The torque setting sources are described as follows:

0: Digital setting (PF-02)

It refers to that the target torque directly uses the PF-02 set value.

1, 2: AI

When AI is used as the frequency setting, voltage/current input correspond to 100.0% of the setting.It refers to the percentage of relative torque digital setting PF-02.The input voltage values of AI and the corresponding relationship curve with the target torque can be freely selected by the user through P2-54.

VH5 provides five groups corresponding relationship curves, among which three groups of curves are linear relationships (2-point corresponding relationship), and two groups of curves are broken lines with 4-point corresponding relationship. Users can set them through Group P2 parameter.

5: Communication setting

The target torque is given by the communication mode.

When Modbus communication is used, the upper computer gives data through the communication address H1000, and the data format is data with 2 decimal places.

H1105 is given a torque (supported by versions 3730 and above), which refers to the percentage of PF-02 set for the torque number. The setting range is 0~1000, and the data format is data with one decimal place, in %. For example, if the upper limit of the driving torque is PF-02=100%, H1105 is given 500, indicating that the torque is given as 100%*50%=50%. Reverse can be set to a negative value through PF-02 or written to H1100 (assuming P0-02=2).

Parameter	Name	Range
PF-03	Torque control forward maximum frequency source	0: Digital setting 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting (the full scale of option 0, 1, 2, 5 correspond to P0-13 digital setting)
PF-04	Torque control forward maximum frequency	0.00Hz~max output frequency

It is used to set the maximum forward or reverse operating frequency of the inverter under torque control mode. The acceleration and deceleration time of the upper frequency limit is set in PC-07 (acceleration) /PC-08 (deceleration).

When the inverter is in torque control, if the load torque is less than the motor output torque, the motor speed will continue to rise. In order to prevent the mechanical system from speeding and other accidents, it is necessary to limit the maximum speed of the motor during torque control.

If it is necessary to dynamically and continuously change the maximum frequency of torque control, it can be achieved by controlling the upper limit frequency.

Parameter	Name	Range
PF-05	Torque control reverse maximum frequency source	0: Digital setting 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting (the full scale of option 0, 1, 2, 5 correspond to P0-13 digital setting)

Parameter	Name	Range
PF-06	Torque control reverse maximum frequency	0.00Hz~max output frequency

Under the torque control mode, the difference between the motor output torque and the load torque determines the speed change rate of the motor and the load. The motor speed may change rapidly, causing problems such as noise or excessive mechanical stress. By setting the acceleration and deceleration time of torque control, the motor speed can change smoothly.

Parameter	Name	Range
PF-07	Torque acceleration time	0.00s～650.00s
PF-08	Torque deceleration time	0.00s～650.00s

In the torque control of small torque starting, it is not recommended to set the torque acceleration and deceleration time. If the torque acceleration and deceleration time is set, it is suggested to increase the speed filter coefficient properly. When torque quick response is needed, torque control acceleration and deceleration time is set to 0.00s.

For example, two motors in hard connection drive the same load. In order to ensure the load distribution evenly, one inverter is set as the master, and the speed control mode is adopted, the other is slave and torque control is adopted. The actual output torque of the master is the torque command of the slave. At this time, the torque of the slave needs to follow the master quickly, then the acceleration and deceleration time of torque control of slave is 0.00s.

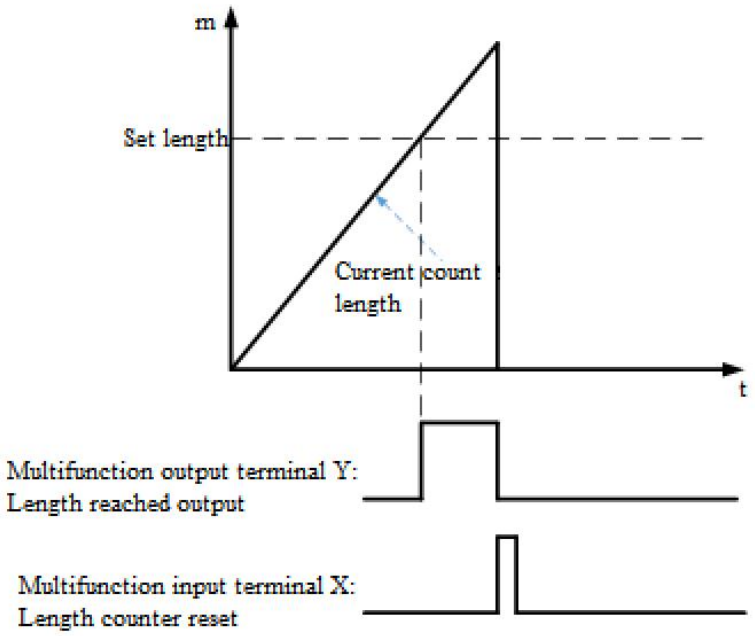
4-2-17. Group A0 Textile

Parameter	Name	Range
A0-00	Setting length	0m~65535m
A0-01	Actual length	0m~65535m
A0-02	Pulse per meter	0.1~6553.5

The above parameters are used for fixed length control.

In the application, it is necessary to set the corresponding input terminal function as "length counting input" (function 22). Up to 3k pulses can be received.

The actual length A0-01 can be calculated by dividing the number of pulses sampled at the terminal by A0-02 pulses per meter.When the actual length is greater than the set length A0-00, the multi-function digital Y outputs "length reached" ON signal. In the process of fixed length control, the length reset operation (function 23) can be carried out through the multi-function X terminal.



Parameter	Name	Range
A0-03	Setting counting value	1~65535
A0-04	Specified counting value	1~65535

In application, the corresponding input terminal function should be set to "counter input" (function 20).

When the count value reaches the set count value A0-03, the multi-function terminal Y outputs the "set count value arrival" ON signal, and then the counter stops counting. When the count value reaches the specified count value A0-04, the multi-function terminal Y outputs the "specified count value arrival" ON signal, and the counter continues to count until the counter stops counting when the "set count value" reached.The counting value reset operation (function 23) can be carried out through the multi-function X terminal.

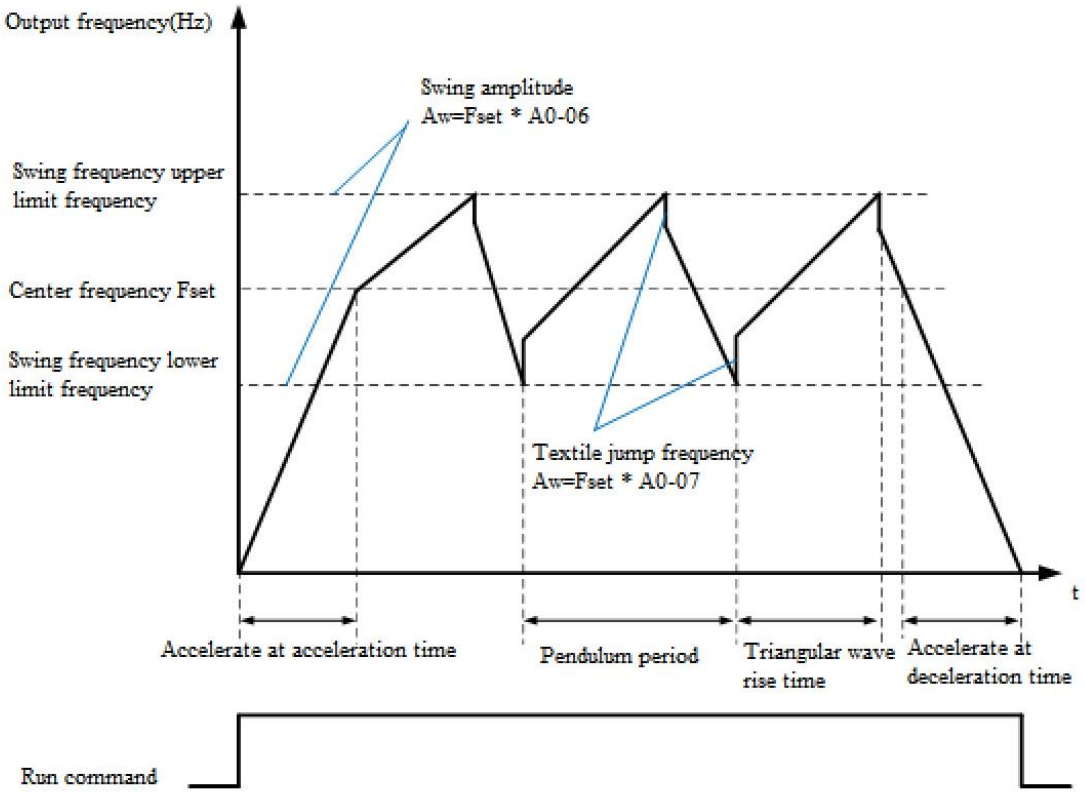
Parameter	Name	Range
A0-05	Swing frequency setting mode	0: relative to center frequency 1: relative to the max frequency

This parameter is used to determine the reference value of swing.

0: relative to the center frequency (P0-03 frequency source), variable swing range system. The swing varies with the center frequency (set frequency).

1: relative to the maximum frequency (P0-13) is a constant swing range system with fixed swing range.

Parameter	Name	Range
A0-06	Swing frequency amplitude	0.0%~100.0%
A0-07	Jump frequency amplitude	0.0%~50.0%
A0-08	Swing frequency period	0.1s~3600.0s
A0-09	Triangular rise time of swing frequency	0.1%~100.0%



A0-06 swing amplitude AW:
When setting swing range relative to center frequency (A0-05 = 0), AW = frequency source P0-03 × amplitude A0-06. When setting swing range relative to maximum output frequency (A0-05 = 1), AW = maximum output frequency P0-13 × swing range PB-21.

A0-08 swing period: the time value of a complete swing period.

A0-07 jump frequency amplitude:
The jump frequency amplitude is the frequency percentage of the jump frequency relative to the swing range when the swing frequency is running, that is: jump frequency = AW × jump frequency amplitude A0-07.
If the swing is relative to the center frequency (A0-05 = 0), the jump frequency is a changing value. If the swing is relative to the maximum output frequency (A0-05 = 1), the jump frequency is a fixed value. The swing operating frequency is constrained by the upper and lower limit frequencies.

A0-09 triangle wave rise time coefficient: it is the time percentage of triangle wave rise time relative to swing period A0-08.
Triangle wave rise time (s) = swing period A0-08 × rise time coefficient of triangular wave A0-09.
Triangle wave falling time (s) = swing period A0-08 × (1 - triangular wave rise time coefficient A0-09).

4-2-18. Group A1 Virtual IO

Parameter	Name	Range
A1-00	Function selection of virtual X1 terminal	0~51 (Same as physical X terminal function setting)
A1-01	Function selection of virtual X2 terminal	
A1-02	Function selection of virtual X3 terminal	
A1-03	Function selection of virtual X4 terminal	

A1-04	Function selection of virtual X5 terminal	
A1-05	Virtual X terminal effective state source	Ones bit: virtual X1 0: the state of virtual Y1 determines whether virtual X1 is valid 1: Function code A1-06 sets whether virtual X1 is valid Tens bit: virtual X2 Hundreds bit: virtual X3 Thousands bit: virtual X4 Ten thousands bit: virtual X5

Parameter	Name	Range
A1-06	Virtual X terminal status setting	Ones bit: virtual X1 0: invalid 1: valid Tens bit: virtual X2 Hundreds bit: virtual X3 Thousands bit: virtual X4 Ten thousands bit: virtual X5

Different from ordinary digital input terminal, virtual X can be set in two ways, and can be selected through A1-05.

When X state is determined by the state of corresponding virtual Y, whether X is valid depends on whether Y output is valid or invalid, and X is uniquely bound to Yx (X is 1 ~ 5).

When virtual X terminal status is set by function code, the status of virtual input terminal is determined by binary bit of function code A1-06. The following is an example of how to use the virtual X terminal.

Example 1: when virtual Y state is selected to determine virtual X state, to complete the following functions: when AI1 input exceeds the upper and lower limits, the inverter will give an alarm and shut down. The following setting methods can be adopted:

Set the function of virtual X as "user defined fault 1" (A1-00 = 38).

The virtual X terminal effective state mode is determined by virtual Y (A1-05 = xxx0). Set the output function of virtual Y1 as "AI input exceeds the upper and lower limits" (A1-11 = 23).

When the AI input exceeds the upper and lower limits, the virtual Y1 output is in the ON state. At this time, the virtual X1 input terminal state is valid. The virtual X1 of the inverter receives the user-defined fault 1, and the inverter will alarm Err48 and shut down.

Example 2: when the function code A1-06 is selected to set the virtual X1 state, the following functions are completed: after the inverter is powered on, it will automatically enter the operation state. The following setting method can be adopted:

Set the function of virtual X1 to "forward running" (A1-00=1).

Set the valid status mode of virtual X1 terminal as function code (A1-05=xxx1).

Set the virtual X1 terminal status to be valid (A1-06=xxx1).

Set the command source to terminal control (P0-02=1).

Set the start protection to "unprotected" (P4-05=0).

After the inverter power on initialization is completed, it is detected that virtual X1 is effective, and the terminal is forward running, which is equivalent to the inverter receiving a terminal forward running command, and the

inverter will start to run forward.

Parameter	Name	Range
A1-07	Function selection of AI terminal as X terminal (version 3744 and above)	0~51 (Refer to P2 for physical X input selection)
A1-08	Function selection of AI terminal as X terminal (below version 3744)	0~51 (Refer to P2 for physical X input selection)
A1-10	Selection of effective mode when AI is used as X terminal	Ones bit: AI (version 3744 and above) 0: low level valid 1: high level valid Tens bit: AI, same as above (below version 3744)

This group of function codes is used to use AI as X. When AI is used as X, if AI input voltage is greater than 7V, AI terminal status is high level. If AI input voltage is lower than 3V, AI terminal status is low level. There is hysteresis between 3V and 7V.

A1-10 is used to determine whether the AI high level is valid or the AI low level is valid when AI is X.

Parameter	Name	Range
A1-11	Virtual Y1 output function selection	0: connect with physical Xx inside 1~42: same to P3 physical Y output selection
A1-12	Virtual Y2 output function selection	
A1-13	Virtual Y3 output function selection	
A1-14	Virtual Y4 output function selection	
A1-15	Virtual Y5 output function selection	
A1-16	Virtual Y1 output delay time	0.0s~3600.0s
A1-17	Virtual Y2 output delay time	0.0s~3600.0s
A1-18	Virtual Y3 output delay time	0.0s~3600.0s
A1-19	Virtual Y4 output delay time	0.0s~3600.0s
A1-20	Virtual Y5 output delay time	0.0s~3600.0s
A1-21	Virtual Y terminal effective state selection	Ones bit: virtual Y1 0: positive logic 1: negative logic Tens bit: virtual Y2 Hundreds bit: virtual Y3 Thousands bit: virtual Y4 Ten thousands bit: virtual Y5

Virtual digital output function is similar to Y output function of control board. It can be used to cooperate with virtual digital input X to realize some simple logic control.

When the output function of virtual Y is selected as 0, the output states of virtual Y1 ~ Y5 are determined by the input states of physical X1 ~ X5 on the control board. At this time, virtual Y corresponds to physical X.

When the virtual Y output function is not 0, the function setting and use method of virtual YI are the same as those of P3 group Y output. Please refer to the description of P3 group Y output.

4-2-19. Group A2 Second motor parameters

VH5 provides two sets of motor control parameters, which can set motor nameplate parameters, encoder parameters and VF vector performance parameters respectively.

Group A2 function code corresponds to motor 2. All parameters and application methods of group A2 are the same as those of motor 1.

Parameter	Name	Range
A2-00	Motor type selection	0: Common asynchronous motor 1: Synchronous motor
A2-01	Motor rated power	0.1kW~650.0kW
A2-02	Motor rated voltage	1V~1200V
A2-03	Motor rated current	0.01A~655.35A (VFD power ≤55kW) 0.1A~6553.5A (VFD power >55kW)
A2-04	Motor rated frequency	0.01Hz~max output frequency
A2-05	Motor rated speed	1rpm~65535rpm
A2-06	Asynchronous motor stator resistance	0.001Ω~65.535Ω (VFD power ≤55kW) 0.0001Ω~6.5535Ω (VFD power >55kW)
A2-07	Asynchronous motor rotor resistance	0.001Ω~65.535Ω (VFD power ≤55kW) 0.0001Ω~6.5535Ω (VFD power >55kW)
A2-08	Leakage inductance of asynchronous motor	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)
A2-09	Asynchronous motor mutual inductance	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)
A2-10	Asynchronous motor current without load	0.01A~A2-03 (VFD power ≤55kW) 0.1A~A2-03 (VFD power >55kW)
A2-15	Synchronous motor stator resistance	0.001Ω~65.535Ω (VFD power ≤55kW) 0.0001Ω~6.5535Ω (VFD power >55kW)
A2-16	Synchronous motor D-axis inductance	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)
A2-17	Synchronous motor Q-axis inductance	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)
A2-19	Synchronous motor back electromotive force coefficient	0~6000.0
A2-32	Polar logarithm of rotation	1~65535
A2-33	Speed feedback PG disconnection detection time	0.0~10.0 (0.0: speed feedback disconnection detection ineffective)
A2-35	Motor parameter self-learning	0: No operation 1: Static tuning 1 2: Dynamic tuning 3: Static tuning 2
A2-36	Motor 2 control mode	0: VF control 1: no speed sensor vector control (SVC)
A2-37	Motor 2 acc/dec time selection	0: Same to first motor 1: Acceleration and deceleration time 1 2: Acceleration and deceleration time 2

Parameter	Name	Range
		3: Acceleration and deceleration time 3 4: Acceleration and deceleration time 4
A2-38	Motor 2 torque boost	0.0%: Automatic torque boost 0.1%~30.0%
A2-40	Motor 2 oscillation suppression gain	0~100
A2-41	Speed loop proportion gain 1	1~100
A2-42	Speed loop integral time 1	0.01s~10.00s
A2-43	Speed loop proportion gain 2	1~100
A2-44	Speed loop integral time 2	0.01s~10.00s
A2-45	Switching frequency 1	0.00~A2-46
A2-46	Switching frequency 2	A2-45~max output frequency (P0-13)
A2-47	Speed loop integral property	Ones bit: integral separation 0: Invalid 1: Valid
A2-48	Slip gain of vector control	50%~200%
A2-49	SVC speed feedback filter time	0.000s~0.100s
A2-51	Torque upper limit source under speed control mode	0: Parameter setting (P6-11) 1: AI (version 3744 and above) 2: AI (below version 3744) 5: Communication setting (The full range of options 0, 1, 2, and 5 corresponds to the A2-52 digital setting)
A2-52	Digital setting of torque upper limit in speed control mode	0.0%~200.0%
A2-55	Proportional gain of excitation regulation	0~60000
A2-56	Integral gain of excitation regulation	0~60000
A2-57	Torque regulation proportional gain	0~60000
A2-58	Integral gain of torque regulation	0~60000

4-2-20. Group A4 Password countdown lock

Parameter	Name	Setting range
A4-00	Parameter group access verification	0～65000
A4-01	Parameter group lock password	0～65000
A4-02	Total power on time before locking	0～7200
A4-03	Remaining time of power on locking	0～7200

In the A4-00 password verification input interface, enter 0. At this point, A4-01 is 0 and verification is successful. You can view and set other parameters for the A4 group.

Set A4-01, A4-02, for example, A4-01=12345, A4-02=3, A4-03 (read-only parameter) will automatically change to 3, and the countdown function will be activated. As long as the total power on time before locking is set to A4-02, the countdown function will be activated.

When the remaining lock time is 0, an ERR-56 fault is reported. And the fault cannot be eliminated. After powering on again at this time, the alarm will immediately alarm. Unable to start. When entering the A4 group again, you need to enter the previously set password to access. After setting A4-02 to 0, the fault can be eliminated by pressing the STOP button on the panel.

Notes:

1. Group A4 parameters cannot be written in communication
2. A4-01 cannot be read by communication
3. A4 group parameters cannot be initialized
4. Err56 cannot be cleared when A4-02 > 0

4-2-21. Group A9 Communication address mapping (supported by 3720 and above versions)

Parameter	Name	Setting range
A9-00	Communication address mapping selection	0: Communication mapping function does not take effect 1: Communication mapping function takes effect
A9-01	Communication address mapping primitive 1	0x0000~0xFFFF
A9-02	Communication address mapping primitive 2	0x0000~0xFFFF
A9-03	Communication address mapping primitive 3	0x0000~0xFFFF
A9-04	Communication address mapping primitive 4	0x0000~0xFFFF
A9-05	Communication address mapping primitive 5	0x0000~0xFFFF
A9-06	Communication address mapping primitive 6	0x0000~0xFFFF
A9-07	Communication address mapping primitive 7	0x0000~0xFFFF
A9-08	Communication address mapping primitive 8	0x0000~0xFFFF
A9-09	Communication address mapping primitive 9	0x0000~0xFFFF
A9-10	Communication address mapping primitive 10	0x0000~0xFFFF
A9-11	Communication address mapping primitive 11	0x0000~0xFFFF
A9-12	Communication address mapping primitive 12	0x0000~0xFFFF
A9-13	Communication address mapping primitive 13	0x0000~0xFFFF
A9-14	Communication address mapping primitive 14	0x0000~0xFFFF
A9-15	Communication address mapping image 1	0x0000~0xFFFF
A9-16	Communication address mapping image 2	0x0000~0xFFFF

A9-17	Communication address mapping image 3	0x0000~0xFFFF
A9-18	Communication address mapping image 4	0x0000~0xFFFF
A9-19	Communication address mapping image 5	0x0000~0xFFFF
A9-20	Communication address mapping image 6	0x0000~0xFFFF
A9-21	Communication address mapping image 7	0x0000~0xFFFF
A9-22	Communication address mapping image 8	0x0000~0xFFFF
A9-23	Communication address mapping image 9	0x0000~0xFFFF
A9-24	Communication address mapping image 10	0x0000~0xFFFF
A9-25	Communication address mapping image 11	0x0000~0xFFFF
A9-26	Communication address mapping image 12	0x0000~0xFFFF
A9-27	Communication address mapping image 13	0x0000~0xFFFF
A9-28	Communication address mapping image 14	0x0000~0xFFFF

This set of communication address mapping parameters is used together with Modbus communication , which is applicable to the situation that the original inverter has been discontinued or needs to be replaced, and the PLC program cannot be modified.

For example, one manufacturer originally used the XINJE **VB5N** inverter to realize the forward operation through Modbus. Now they want to change to **VH5** inverter without modifying the PLC program. It is necessary to enable communication address mapping function.

Notice: Please pay attention to whether the content settings are consistent.

For example:

Decelerate and stop function. VB5N :assign 7 to H2000,

VH5 : assign 5 to H1100.

Turning on the mapping function can only modify the corresponding address, but cannot modify the content in the address. If the value is set in the program, writing 7 to H1100 means “fault reset”, and the program still needs to be modified under this condition.

VH5		VB5N	
Modbus address	Function	Modbus address	Function
1000H	Communication frequency	2001H	Communication frequency

1100H	1: Forward running 2: Reverse operation 3: Forward jog 4: Reverse jog 5: Deceleration stop 6: Free stop 7: Fault reset	2000H	01H:Running command 02H:Forward command 03H:Reverse command 04H:Jog command(forward) 05H:Jog forward command 06H:Jog reverse command 07H:Decelerate stop command 08H:Emergency stop command 09H:Jog stop command 0AH:Fault reset command

Specific instructions are as follows:

When the A9-00 is set to 1, the communication mapping function is enabled, and the data can only be read and written through the mapping address set in A9-01~A9-14. If the communication address in the data frame is inconsistent with the address value set in A9-01~A9-14, the inverter reply frame will report the communication address error, resulting in alarm of normal communication control.

For example, the original control system needs to start and stop (forward rotation) through communication and given frequency. Use VH5 replace VB5N, the frequency address is 0x2000, and the start and stop control address is 0x2001. A9-00 is set to 1, A9-01 is set to 0x2000, A9-02 is set to 0x2001, A9-15 is set to 0x1000 , and A9-16 is set to 0x1100.

Write 50.00Hz data frame: 01 06 20 00 27 10 97 36

Start / Stop data frame: 01 06 20 01 00 01 12 0A

4-2-22. Group AD AIAO correction parameters

Parameter	Name	Range
AD-00	AI measured voltage 1 (version 3744 and above)	0.500V~4.000V
AD-01	AI display voltage 1 (version 3744 and above)	0.500V~4.000V
AD-02	AI measured voltage 2 (version 3744 and above)	6.000V~9.999V
AD-03	AI display voltage 2 (version 3744 and above)	6.000V~9.999V
AD-04	AI measured voltage 1 (below version 3744)	0.500V~4.000V
AD-05	AI display voltage 1 (below version 3744)	0.500V~4.000V
AD-06	AI measured voltage 2 (below version 3744)	6.000V~9.999V
AD-07	AI display voltage 2 (below version 3744)	6.000V~9.999V

This group of function codes is used to correct the analog input AI to eliminate the influence of bias and gain of the analog input.

This group of function parameters have been corrected before leaving the factory, and when the factory value is restored, it will return to the factory corrected value. Generally, there is no need for correction in the application site.
The measured voltage refers to the actual voltage measured by the multimeter and other measuring instruments, and the displayed voltage refers to the voltage display value sampled by the inverter. See the voltage (U0-27) before AI correction of U0 group.

When correcting, input two voltage values at each AI input port, and input the value measured by the multimeter and the values read by U0 group into the above function code, then the inverter will automatically correct the AI bias and gain.
For the case that the user given voltage and the actual sampling voltage of the converter do not match, the field correction method can be adopted to make the sampling value of the converter consistent with the expected value. The field correction method is as follows:
Given AI voltage signal (about 2V)
The actual measurement of AI voltage value is saved in AD-04, U0-27 is saved in AD-05.
Given AI voltage signal (about 8V)
The actual measurement of AI voltage value is saved in AD-06, U0-27 is saved in AD-07.

Parameter	Name	Range
AD-12	AO target voltage 1	0.500V~4.000V
AD-13	AO measured voltage 1	0.500V~4.000V
AD-14	AO target voltage 2	6.000V~9.999V
AD-15	AO measured voltage 2	6.000V~9.999V

This group of function codes is used to correct the AO of analog output to eliminate the influence of bias and gain of analog output.

This group of function parameters has been corrected before leaving the factory, and when the factory value is restored, it will return to the factory corrected value. Generally, there is no need for correction in the application site.

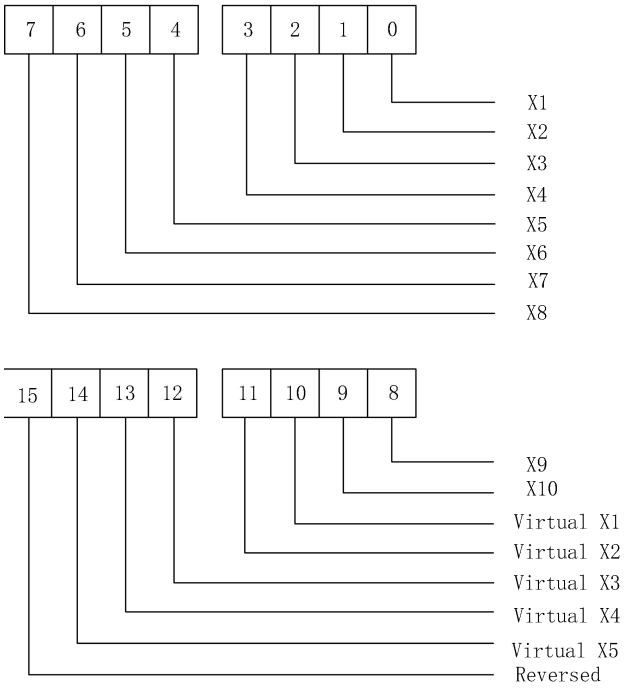
4-2-23. Group U0 Monitor parameters

Parameter	Name	Min unit
U0-00	Operation frequency (Hz)	0.01Hz
U0-01	Setting frequency (Hz)	0.01Hz
U0-02	Bus voltage (V)	0.1V
U0-03	Output current (A)	0.01A
U0-04	Output voltage (V)	1V
U0-05	Output torque (%) Percentage output value of motor rated torque	0.1%
U0-06	Output power (kW)	0.1kW

Monitor the frequency, bus voltage, current, torque, and output power parameters of the frequency converter during operation.

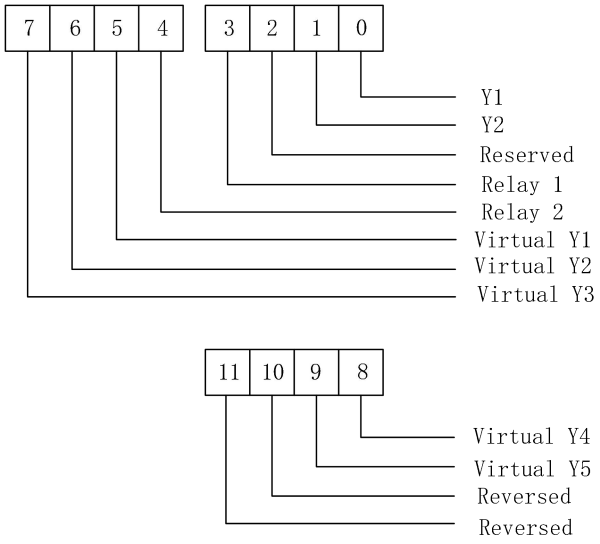
Parameter	Name	Min unit
U0-07	X input state	1

Displays the current X terminal input status value. DX corresponds to the virtual X terminal state. After hexadecimal conversion to binary data, each bit corresponds to an X input signal. 1 indicates that the input is a high-level signal, and 0 indicates that the input is a low-level signal. The corresponding relationship between each bit and input terminal is as follows:



Parameter	Name	Min unit
U0-08	Y output state	1

Displays the current Y terminal output status value. After hexadecimal conversion to binary data, each bit corresponds to an output signal. 1 indicates that the input is a high-level signal, and 0 indicates that the input is a low-level signal. The corresponding relationship between each bit and input terminal is as follows:



Parameter	Name	Display range
U0-09	AI voltage (V)/current (mA) (version 3744 and above)	0.00V~10.57V/0.00mA~20.00mA
U0-10	AI voltage (V)/current (mA) (below version 3744)	0.00V~10.57V /0.00mA~20.00mA

Whether the analog input is voltage or current, U0-10 is displayed as the voltage value, and the current value needs to be multiplied by 2 on the basis of U0-10.

For example: (version below 3744) AI input 5V analog voltage, U0-10 display value should be 5V, AI input 10mA analog current, then U0-10 display value is 5, the calculated analog current is 10mA.

Parameter	Name	Display range
U0-14	PID setting	0~65535
U0-15	PID feedback	0~65535

PID setting = PID setting (percentage) *PA-20

PID feedback = PID feedback (percentage) *PA-20

Parameter	Name	Display range
U0-16	Load speed display	-

The set load speed is displayed during shutdown and the running load speed is displayed during operation. The value displayed by the parameter can be adjusted according to P8-21 and P8-22. See Group P8 parameter description for details.

Parameter	Name	Display range
U0-17	Feedback speed (Hz)	0.01Hz~max output frequency

Display the given frequency.

Parameter	Name	Display range
U0-20	PLC stage	0~15

When using the simple PLC function, monitor the current number of operating segments, parameter Pb group parameter settings.

Parameter	Name	Display range
U0-21	Count value	0~65535
U0-22	Length value	0~65535

When using the inverter counting and length fixing functions to view the count value and length value received by the sent inverter. Refer to A0 group parameter description.

Parameter	Name	Display range
U0-23	Main frequency A display	0.01Hz~max output frequency
U0-24	Auxiliary frequency B display	0.01Hz~max output frequency

Display the set values of main and auxiliary frequency.

Parameter	Name	Display range
U0-25	Communication setting	-100.00%~100.00%

Display the value written in the H1000 through modbus communication.

Parameter	Name	Display range
U0-26	AI voltage(V)/current (mA) before calibration (version 3744 and above)	0.000V/0.000mA~10.570V/20.000mA
U0-27	AI voltage(V)/current (mA) before calibration (below version 3744)	0.000V/0.000mA~10.570V/20.000mA

Display the actual value of analog input sampling voltage / current.

The actually used voltage / current has been linearly corrected to make the deviation between the sampled voltage / current and the actual input voltage / current smaller.

Monitor U0-09 (version 3744 and above) and U0-10 (below version 3744) for the actually used correction

voltage / current.

Parameter	Name	Display range
U0-29	Remaining running time	0.0Min~6500.0Min

Display the remaining running time when the timing function is running. Refer to PC group timing function parameter settings.

Parameter	Name	Display range
U0-30	Present power on time	0~65000min
U0-31	Present operation time	0.0~6500.0min

Display the power on time and running time of this power on. This parameter is not memorized when power is off.

Parameter	Name	Display range
U0-33	Present fault	1~56

The current fault code is displayed.

Parameter	Name	Display range
U0-35	Target torque (%)	-200%~200%

When PF-01 selects 0, U0-35 is the same value with PF-02.

Parameter	Name	Display range
U0-36	Torque upper limit	-200%~200%

Displays the currently given torque upper limit value.

Parameter	Name	Display range
U0-41	Power factor angle	-

Display the current operating power factor angle.

Parameter	Name	Display range
U0-42	Setting frequency (%)	-100.00%~100.00%
U0-43	Operation frequency (%)	-100.00%~100.00%

The current setting frequency and operating frequency are displayed, and 100.00% corresponds to the maximum frequency of the inverter P0-13.

Parameter	Name	Display range
U0-44	VF separate target voltage	0~motor rated voltage V
U0-45	VF separate output voltage	0~motor rated voltage V

Display the target output voltage and current actual output voltage when running in VF separation state. Refer to Group P5 VF separation parameter settings.

Parameter	Name	Display range
U0-47	Motor serial number	0: motor 1 1: motor 2

Display the current motor parameter selection.

Parameter	Name	Display range
U0-65	Cumulative operation time of inverter (**supported by 3720 and above versions**)	0~3600s

When U0-65 reaches 3600s, U0-65 will be cleared, and P8-10 adds 1h.

Parameter	Name	Display range
U0-66	Motor speed (**supported by 3720 and above versions**)	0~motor rated speed rpm
U0-67	Communication expansion card model	-

Display the current speed of the motor.

Display the communication expansion card model.

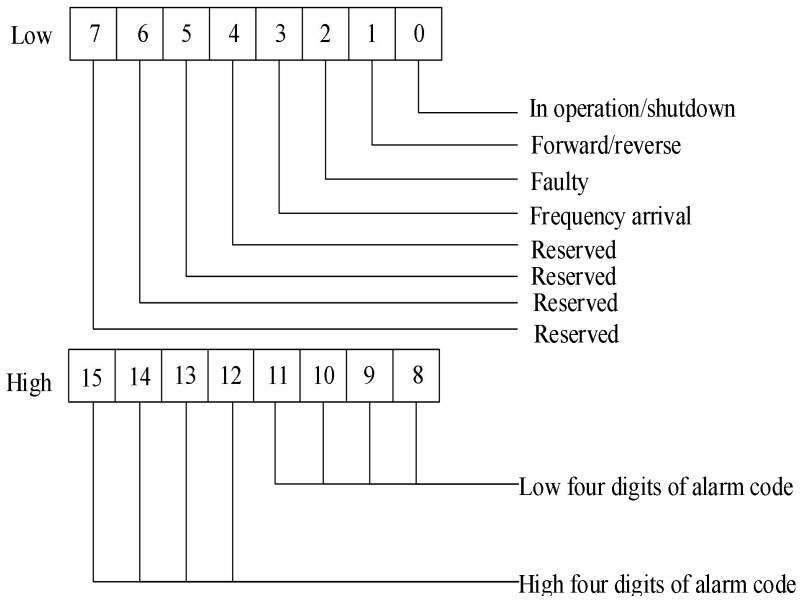
Parameter	Name	Display range
U0-68	Communication expansion card version	-
U0-69	Communication expansion card feedback VFD status	0x0000~0xFFFF

U0-68 displays the expansion card version. It is the same as the display value of U4-09 expansion card version number.

U0-69 displays the VFD operation status in communication status.

The displayed value is in hexadecimal. After converting hexadecimal to binary data, each bit corresponds to an output signal. A value of 1 indicates that the input is a high-level signal, and a value of 0 indicates that the input is a low-level signal. The correspondence between each bit and the input terminal is shown in the following figure. The fault code displayed after converting the corresponding bits from BIT8 to BIT15 to decimal.

Explanation of fault meaning: U0-69=H.2C04, hexadecimal 2C converted to decimal 44 represents the current fault code of ERR44, hexadecimal 04 converted to binary 100 represents the current fault state.



Parameter	Name	Display range
U0-70	Communication feedback motor speed 1	Unit: 0.1Hz

Display the motor speed fed back by communication, unit: Hz.

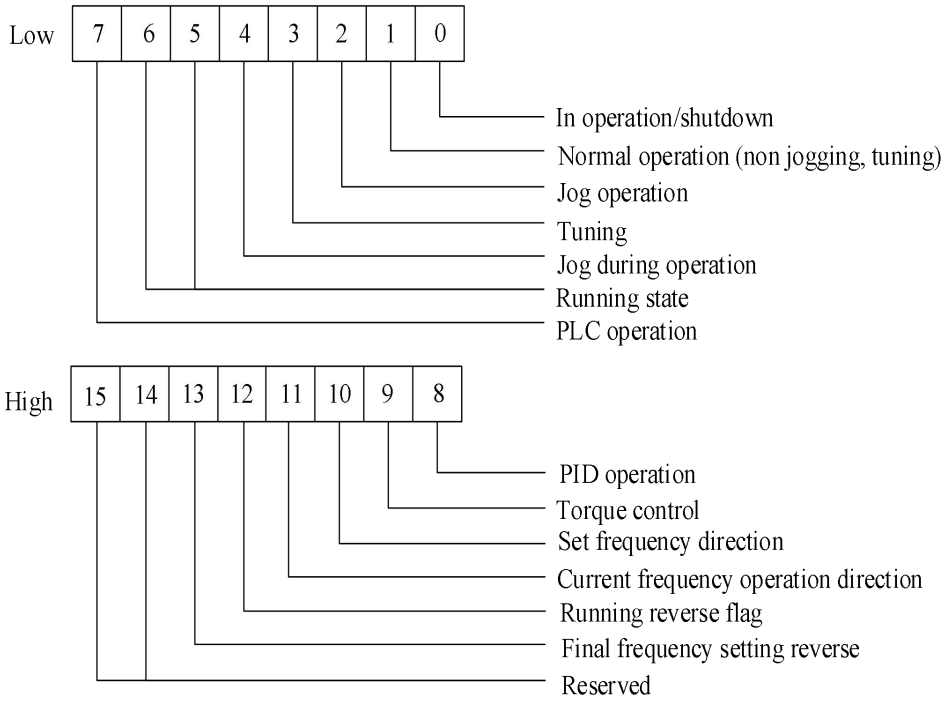
Parameter	Name	Display range
U0-71	Communication feedback motor speed 2	Unit: RPM

Display the motor speed fed back by communication, unit: rpm.

Parameter	Name	Display range
U0-72	Special current display for communication card	-
U0-73	Communication card error status	-
U0-74	Motor actual output torque	-200.00%~200.00%

The output torque is based on the rated current of the inverter, and the maximum value corresponds to P6-11 and PF-02.

Parameter	Name	Display range
U0-75	Fault code	1~56
U0-76	Operation status word	0x0000~0xFFFF



4-2-24. Group U4 Communication monitoring parameters

Parameter	Name	Unit	
U4-00	Speed command (communication frequency setting value)	0.01%	
U4-01	Communic ation control command word	Bit	Description
		BIT0~BIT7	1: Forward command 2: Reverse command 3: Jog forward command 4: Jog reverse command 5: Decelerate and shut down according to the shutdown mode

Parameter	Name	Unit	
			function code. 6: Free shutdown 7: Fault reset
		BIT8~BIT15	Fault code sent by expansion card fault

In communication mode, display the communication control command word, with the displayed value converted from hexadecimal to binary. After converting from hexadecimal to binary data, each bit corresponds to an output signal. A value of 1 indicates that the input is a high-level signal, and a value of 0 indicates that the input is a low-level signal. The correspondence between each bit and the input terminal is shown in the table above. BIT8-BIT15 corresponds to a fault code displayed by converting the bit to decimal.

Parameter	Name	Unit
U4-02	Communication control DO	-
U4-03	Communication control FMP	-
U4-04	Communication control AO1	-
U4-05	Communication control AO2	-
U4-06	Torque command (Communication torque setting value)	0.01%
U4-07	Speed command (communication frequency setting value)	1RMP
U4-08	Expansion card model	-
U4-09	Expansion card version number	-
U4-10	Expansion card error status	-

The TPDO parameters U4-00, U4-01, U4-08, U4-09, U4-10, U4-03, and U4-06 are fixed TPDO parameters mapped to the EtherCAT communication expansion card. These 7 parameters cannot be freely configured by the user and correspond to TPDO1~TPDO7. The original data written to the main station can be viewed through the corresponding function code of the U4 group.

The RPDO parameters are fixed to U0-67, U0-68, U0-69, U0-70, U0-74, U0-00, U0-55, and U0-56. The RPDO parameters mapped to the EtherCAT communication expansion card correspond to RPDO1 to RPDO8, and cannot be freely configured by the user. The original data sent from the slave station can be viewed through the U group function code corresponding to the frequency converter. The last four parameters can be freely configured by the user on the upper computer, such as RPDO9~RPDO12 being configured as U0-53 to U0-56 encoder position counting.

TPDO parameters:

Parameter	Mapping parameters	Written parameters	Name	Range	
TPDO1	PE-00	U4-00	Speed command (communication frequency setting value)	Unit: 0.01%	
TPDO2	PE-01	U4-01	Communication control command word	Bit	Description
				BIT0~ BIT7	1: Forward command 2: Reverse command 3: Jog forward command 4: Jog reverse command 5: Slow down and stop according to the stop mode function code.

Parameter	Mapping parameters	Written parameters	Name	Range	
					6: Free shutdown 7: Fault reset
				BIT8~ BIT15	Fault code sent by expansion card fault
TPDO3	PE-02	U4-08	Expansion card model	-	
TPDO4	PE-03	U4-09	Expansion card version number	-	
TPDO5	PE-04	U4-10	Expansion card error status	-	
TPDO6	PE-05	U4-03	Communication control FMP	-	
TPDO7	PE-06	U4-06	Torque command (Communication torque setting value)	Unit: 0.01%	
TPDO8~ TPDO12	Cannot be configured by user				

RPDO parameters

Parameter	Mapping parameters	Read parameters	Name	Range
RPDO1	PE-20	U0-67	Communication expansion card model	Unit：0.01%
RPDO2	PE-21	U0-68	Communication expansion card version	
RPDO3	PE-22	U0-69	Communication expansion card VFD state	Description
				Bit0: 0: shutdown 1: in operation
				Bit1: operation direction 0: forward 1: reverse
				Bit2: fault 0: no fault 1: faulty
				Bit3:Frequency reaches the set frequency (supported by 3720 and above versions)
				Bit8~Bit15: alarm code (supported

Parameter	Mapping parameters	Read parameters	Name	Range
				by 3720 and above versions)
RPDO4	PE-23	U0-70	Motor feedback speed /0.01Hz	Unit: 0.1Hz
RPDO5	PE-24	U0-74	Motor actual output torque	Unit: 0.0%
RPDO6	PE-25	U0-00	Operation frequency (Hz)	Unit: 0.01%
RPDO7	PE-26	U0-55	Encoder position high bit	
RPDO8	PE-27	U0-56	Encoder position low bit	
RPDO9~RPDO12	Users can freely configure			

EtherCAT communication mode can give speed command and torque command at the same time.
U4-00 is speed command, unit: 0.01%.
U4-06 is torque command, unit: 0.01%.
Parameter setting table in speed mode:

Parameter	Name	Setting value
P0-02	Operation command channel selection	2: Communication port
P0-03	Main frequency source A selection	6: Communication setting
P6-10	Speed control (drive) torque upper limit source	5: Communication setting
P9-00	Serial communication protocol selection	1: Extension card
P9-02	Communication baud rate	6: 115200 BPS
PF-00	Torque control	0: Speed control

In the speed control mode, the speed command is given through U4-00 mapped by TPDO. If the upper limit value of driving torque is modified through TPDO in speed mode, P6-10 can be set to 5, and the torque value is given through mapped U4-06.

Parameter setting table in torque mode:

Parameter	Name	Setting value
P0-01	First motor control mode(torque mode is only valid in vector control mode)	1: No speed sensor vector control (SVC) 2: With speed sensor vector control
P0-02	Operation command channel selection	2: Serial port operation command channel
P0-03	Main frequency source A selection	6: Communication setting
P9-00	Serial communication protocol selection	1: Extension card
P9-02	Communication baud rate	6: 115200BPS
PF-00	Torque control	1: Torque control
PF-01	Upper limit source of driver torque	5: Communication setting
PF-03	Torque control forward direction max frequency source	5: Communication setting

Parameter	Name	Setting value
PF-05	Torque control reverse direction max frequency source	5: Communication setting

In the torque control mode, the torque command is given by U4-06 mapped by TPDO. If the forward / reverse maximum frequency value is modified by TPDO in the torque mode, PF-03/PF-05 can be set to 5, and the frequency value is given by mapped U4-00.

5. EMC

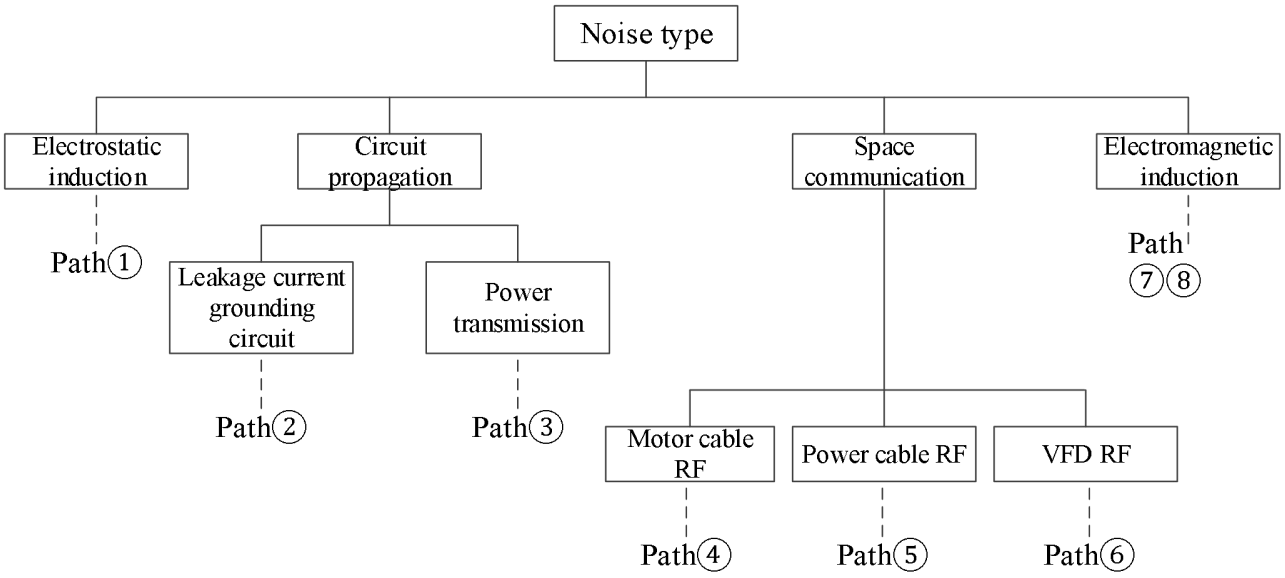
5-1. EMC compliant installation guidelines

The output of the inverter is PWM wave, which will produce electromagnetic noise when it works. In order to reduce the interference of the inverter to the outside world, this section introduces the installation method of EMC in noise suppression, field wiring, grounding, leakage current, power filter use and so on.

5-1-1. Noise suppression

- Noise type

The noise generated by the operation of the inverter may affect the nearby instruments and equipment. The degree of influence is related to the control system of the inverter, the anti-noise ability of the equipment, the wiring environment, the safe distance, the grounding method and other factors. The types of noise include: electrostatic induction, circuit transmission, space transmission, electromagnetic induction, etc.



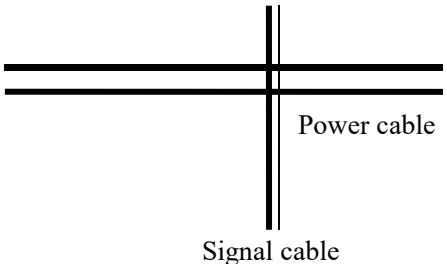
- Basic countermeasures for noise suppression

Noise propagation path	Solution
②	When the grounding wire of peripheral equipment and the wiring of inverter form a closed loop, the leakage current of the inverter grounding wire will cause the equipment to misbehave. At this time, if the equipment is not grounded, it will reduce the misoperation.
③	When the power supply of peripheral equipment and the power supply of inverter share the same system, the noise generated by the inverter propagates against the power line, which will disturb other equipment in the same system. The following measures can be taken to suppress the noise: installing electromagnetic noise filter at the input end of the inverter. Use isolation transformer or power filter to isolate other equipment.
④⑤⑥	(1) Equipment and signal lines that are easy to be disturbed should be installed as far away from the inverter as possible. The signal line should use shielded wire, the shielding layer should be

	single ended grounding, and should be as far away from the inverter and its input and output lines as possible. If the signal wire must intersect with the strong current cable, the two should be kept orthogonal. (2) High frequency noise filters (ferrite common mode choke) are installed at the root of the input and output sides of the inverter, which can effectively suppress the RF interference of the power line. (3) The motor cable should be placed in the barrier with larger thickness, such as in the pipe with thickness (more than 2mm) or embedded in the cement tank. The power line is sheathed in the metal pipe and grounded with the shielded wire (the motor cable adopts 4-core cable, one of which is grounded on the inverter side and the other side is connected to the motor shell).
①⑦⑧	Avoid parallel wiring or binding of strong and weak current wires. It should be far away from the installation equipment of inverter as far as possible, and its wiring should be far away from the input and output lines of inverter. Shielded wire is used for signal line and power line. For the equipment with strong electric field or magnetic field, pay attention to the relative installation position with inverter, and keep the distance and orthogonality.

5-1-2. Field wiring and grounding

1. The cable (U, V, W terminal outgoing line) from the inverter to the motor should avoid parallel wiring with the power line (R, S, T or L, N terminal input line) as far as possible. Keep a distance of more than 30cm.
2. The three motor wires of inverter output U, V and W terminals shall be placed in metal tube or metal wiring slot.
3. The control signal line shall be shielded cable, and the shielding layer shall be connected with the PE end of the inverter, and the single end grounding near the side of the inverter.
4. The PE end grounding cable of inverter shall not borrow the grounding wire of other equipment, but must be directly connected with the ground.
5. The control signal line shall not be parallel to the strong current cable (R, S, T or L, N and U, V, W) for short distance wiring, and shall not be bundled together. The distance above 20 ~ 60 cm (related to the strong current) shall be maintained. If you want to intersect, you should cross each other vertically, as shown in the figure below.



6. Weak current grounding wires such as control signals and sensors must be grounded independently from strong current grounding wires.
7. It is forbidden to connect other devices on the power input terminal (R, S, T or L, N) of inverter.

6. Model and dimension

6-1. VH5 series VFD electrical specification

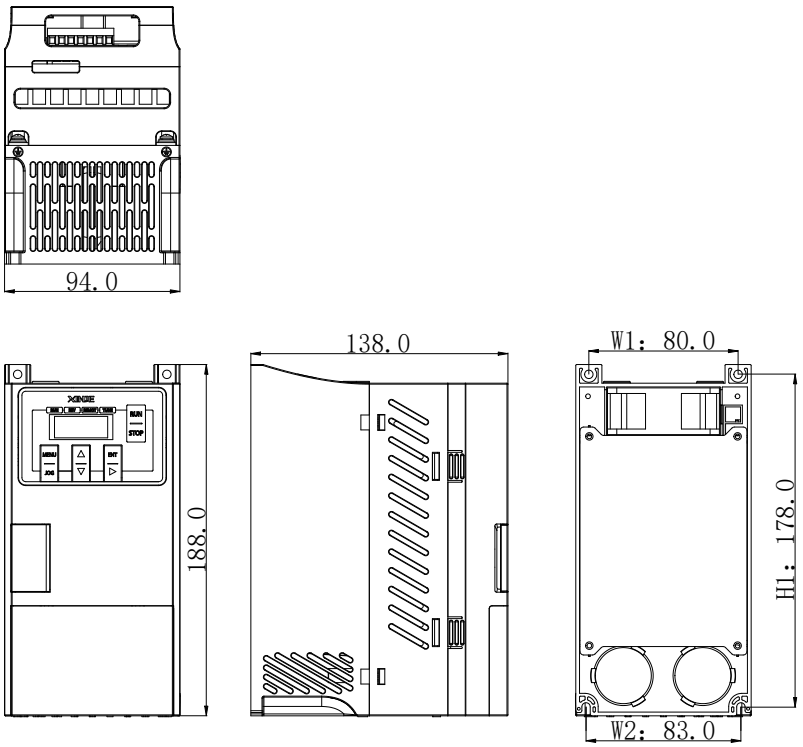
Voltage level	VFD model	Input power capacity (KVA)	Input current (A)	Output current (A)	Matched motor (kW)
Three phase 380V 50Hz/60Hz	VH5-40.7G/1.5P-B	1.5	3.4	2.1	0.75
	VH5-41.5G/2.2P-B	3.0	5.0	3.8	1.5
	VH5-42.2G/3.7P-B	4.0	5.8	5.1	2.2
	VH5-43.7G/5.5P-B	5.9	10.5	9.0	3.7
	VH5-45.5G/7.5P-B	8.9	14.6	13.0	5.5
Single/Three phase 220V, 50Hz/60Hz	VH5-20P7-B	1.5	5.6	4.0	0.75
	VH5-21P5-B	3.0	9.3	7.0	1.5
	VH5-22P2-B	4.5	12.7	9.6	2.2

6-2. VH5 series VFD dimension

- VH5-20P7-B/VH5-21P5-B/VH5-22P2-B

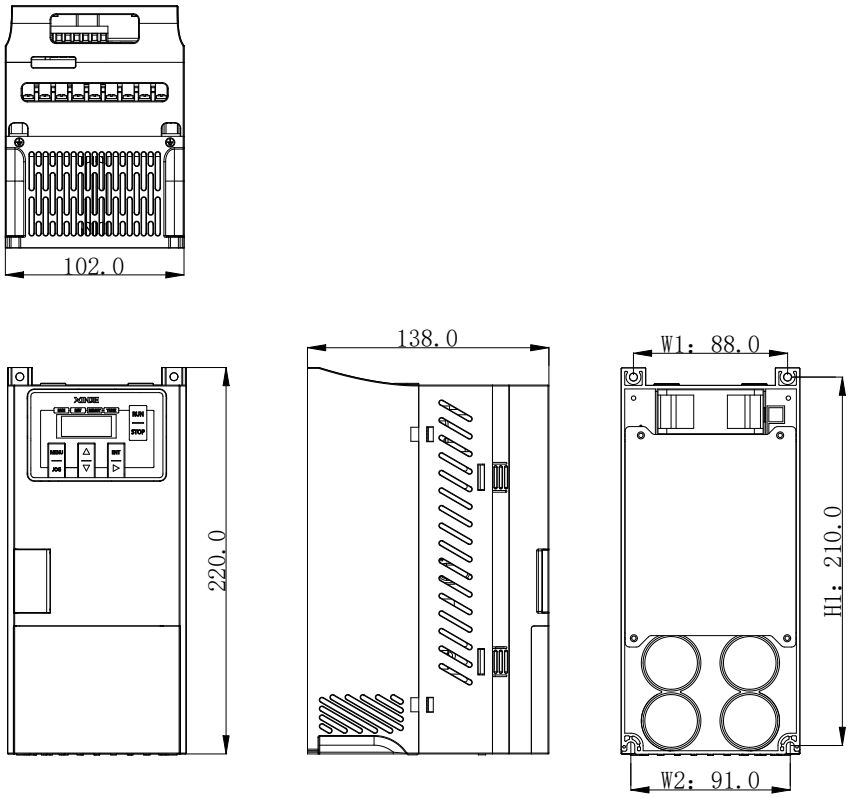
  VH5-40.7G/1.5P-B // VH5-41.5G/2.2P-B // VH5-42.2G/3.7P-B // VH5-43.7G/5.5P-B

Unit: mm



Note: the installation screw is M4.

- VH5-45.5G/7.5P-B Unit: mm



Note: the installation screw is M4.

6-3. Accessories selection guide

6-3-1. Accessories functions

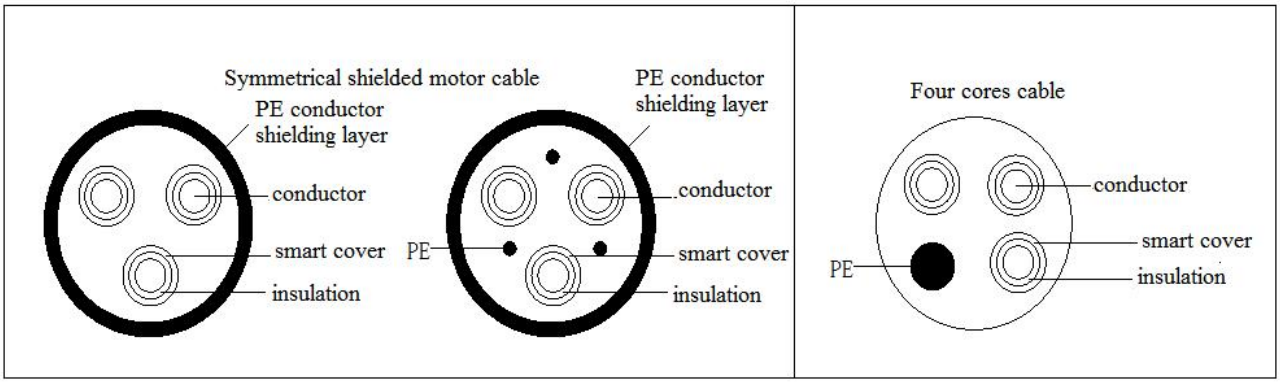
Name	Functions
Cable	A device for transmitting electrical signals
Circuit breaker	To prevent electric shock and the short circuit to ground which may cause leakage current fire (please select leakage circuit breaker for inverter device and with function of suppressing high harmonic. Rated sensitive current of circuit breaker shall be more than 30mA for one inverter.)
AC contactor	In order to effectively cut off the input power of the inverter in case of system failure, an electromagnetic contactor is installed on the input side to control the on-off of the main circuit power supply, so as to ensure safety.
input reactor	It is suitable for improving the power factor of the input side of the inverter and restraining the high-order harmonic current.
DC reactor	
Input filter	To suppress the electromagnetic interference of the inverter transmitted to the public power grid through the input power line, please install it as close to the input terminal side of the inverter as possible.
Fuse	It mainly plays the role of overload protection. When the input current of the inverter rises to a certain height and heat, the fuse itself will fuse to cut off the current, which can protect the safe operation of the inverter.
Braking resistor	The regenerative energy of motor is consumed by resistor or resistor unit to shorten deceleration time and avoid over-voltage alarm of inverter.

Output filter	Suppress the interference generated from the output side wiring of the inverter. Please install it close to the output terminal of inverter.
output choke	It is used to extend the effective transmission distance of the inverter and effectively suppress the instantaneous high voltage generated when the IGBT module of the inverter is switched.

6-3-2. Cable selection

Power cable

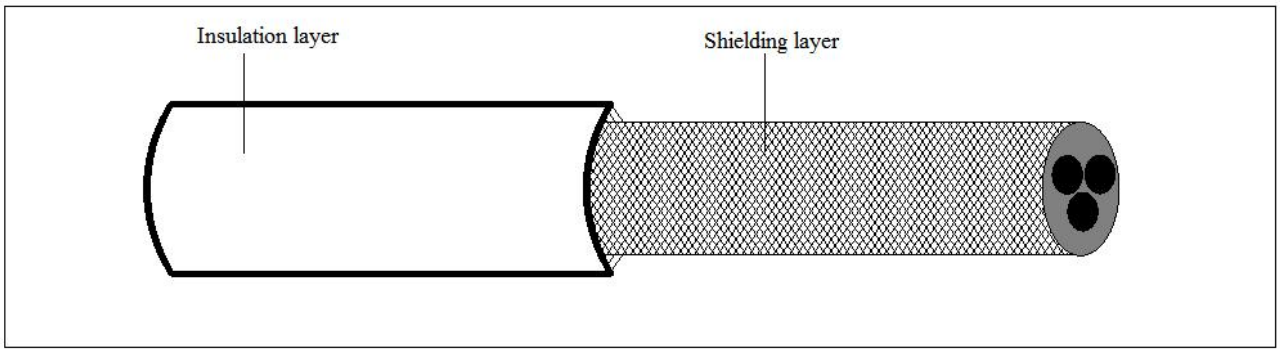
- The size of input power cable and motor cable shall comply with local regulations.
- The input power cable and motor cable must be able to withstand the corresponding load current.
- The maximum rated temperature margin of motor cable under continuous working condition should not be lower than 70°C.
- The conductivity of PE grounding conductor is the same as that of phase conductor.
- For EMC requirements, please refer to the chapter "EMC".
- In order to meet the EMC requirements of CE, symmetrical shielded motor cable must be used.
- Four core cable can be used for input cable, but shielded symmetrical cable is recommended. Compared with four core cable, using symmetrical shielded cable can reduce the loss of motor cable and electromagnetic radiation.



Note: if the conductivity of the shielding layer of the motor cable cannot meet the requirements, a separate PE conductor must be used.

In order to protect the conductor, when the shielding wire and the phase conductor are made of the same material, the cross-sectional area of the shielding wire must be the same as that of the phase conductor, so as to reduce the grounding resistance and improve the impedance continuity.

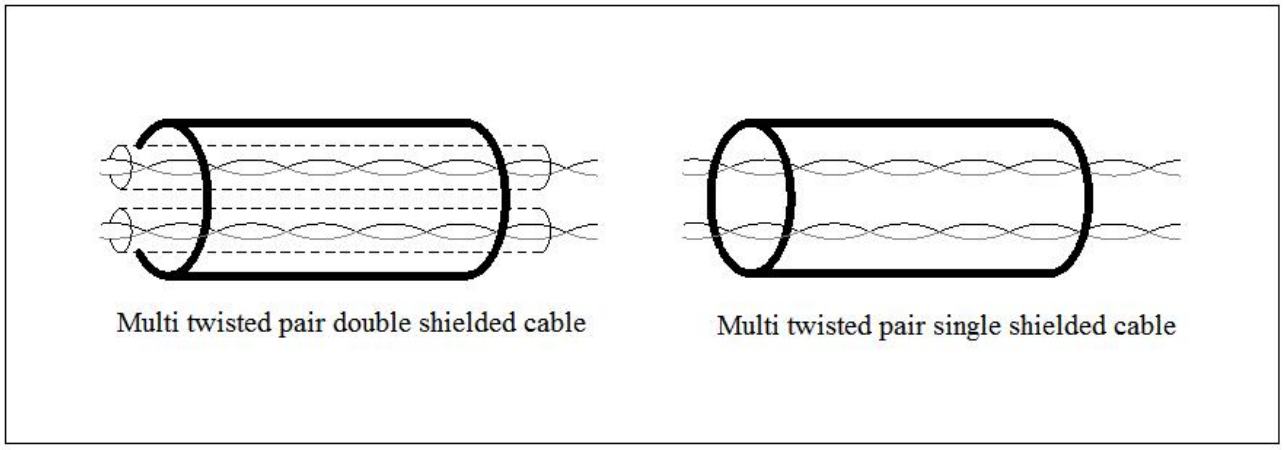
In order to effectively suppress the emission and conduction of radio frequency interference, the conductivity of the shielding wire must be at least 1/10 of that of the phase conductor. For copper or aluminum shielding, this requirement is very easy to meet. The minimum requirements of inverter motor cable are shown in the figure below. The cable contains a spiral copper strip. The tighter the shielding layer is, the better, because the tighter it is, the more effectively it can suppress the electromagnetic interference radiation.



Control cable

All analog control cables and cables used for frequency input must use shielded cables. The analog signal cable uses twisted pair shielded cable. Each signal uses a separate pair of shielded twisted pairs. Do not use the same ground wire for different analog signals.

For low-voltage digital signal, it is better to choose double layer shielded cable, but single shielded or unshielded twisted pair can also be used, but for frequency signal, shielded cable must be used.



Relay cables need to be shielded with metal braid.

The keyboard needs to use network cable. For the electromagnetic environment, it is recommended to use shielded network wire.

Note:

(1) Analog and digital signals are routed separately using different cables.

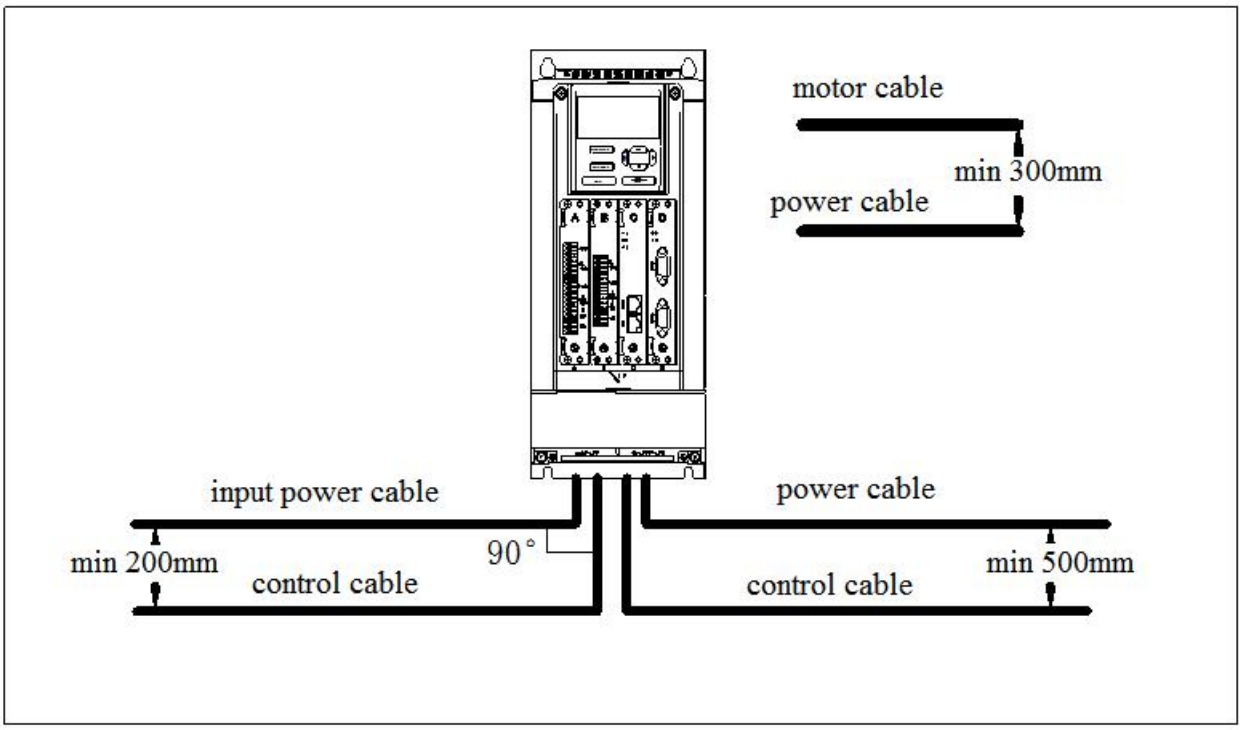
(2) Before connecting the input power cable of the inverter, check the insulation of the input power cable according to the local regulations.

Cable wiring

The routing of motor cable must be far away from the routing of other cables. The motor cables of several inverters can be run side by side. It is suggested that the motor cable, input power cable and control cable should be distributed in different trunking. The reason to avoid the side-by-side routing of other cables and motor cables is that the du/dt output from the inverter will increase the electromagnetic interference to other cables.

If the control cable and the power cable must be crossed, the angle between the control cable and the power cable must be 90 degrees.

The cable trunking must be well connected and well grounded. Aluminum trunking can make local equipotential.



Insulation inspection

Before operation, please check the insulation of motor and motor cable

(1) Make sure that the motor cable is connected to the motor, and then remove the motor from the output terminal UVW of the inverter.

(2) Use a 500VDC megger to measure the insulation resistance between each phase conductor and the protective grounding conductor. For the insulation resistance of the motor, please refer to the motor manufacturer's instructions.

(3) If the inside of the motor is wet, the insulation resistance will decrease. If moisture is suspected, dry the motor and measure again.

6-3-3. Selection guidance of circuit breaker, contactor and fuse

- In order to prevent the overload from damaging the inverter, it is necessary to add a fuse at the incoming end.
- A manually operated power short circuit device (MCCB) needs to be installed between AC power supply and inverter. The circuit breaker equipment must be able to be locked in the cut off position to facilitate installation and maintenance. The capacity of the circuit breaker is generally 1.5-2 times of the rated current of the inverter.
- In order to effectively cut off the input power of inverter in case of system failure, AC contactor can be installed on the input side to control the on-off of main circuit power supply, so as to ensure safety.

VFD model	Breaker (A)	Rated current of contactor (A)	Fuse (A)
VH5-20P7-B	16	12	2.5
VH5-21P5-B	25	18	4.0
VH5-22P2-B	32	25	4.0
VH5-40.7G/1.5P-B	6	9	6.0
VH5-41.5G/2.2P-B	10	9	10
VH5-42.2G/3.7P-B	10	9	10

VH5-43.7G/5.5P-B	16	12	16
VH5-45.5G/7.5P-B	20	18	20

Note: the parameters of the options in the table are ideal values, which can be adjusted according to the actual situation, but try not to be lower than the parameters in the table.

6-3-4. Reactor selection guide

- In order to prevent the instantaneous large current from flowing into the input power circuit and damaging the rectifier components when the power grid is under high voltage input, AC reactor should be connected to the input side, which can also improve the power factor of the input side.
- When the distance between the inverter and the motor is more than 50 meters, the leakage current is large due to the parasitic capacitance effect of the long cable to the ground, and the inverter is prone to over-current protection. At the same time, in order to avoid the insulation damage of the motor, the output reactor must be added for compensation. When a inverter is equipped with multiple motors, the sum of the cable length of each motor is considered as the total length of the motor cable. When the total length is greater than 50m, the output reactor must be added at the output side of the inverter.

VFD model	Input reactor	Output reactor
VH5-40.7G/1.5P-B	ACLSG-5A/4.4V	OCLSG-5A/2.2V
VH5-41.5G/2.2P-B	ACLSG-6A/4.4V	OCLSG-6A/2.2V
VH5-42.2G/3.7P-B	ACLSG-6A/4.4V	OCLSG-6/2.2V
VH5-43.7G/5.5P-B	ACLSG-10A/4.4V	OCLSG-10A/22V
VH5-45.5G/7.5P-B	ACLSG-15A/4.4V	OCLSG-15A/2.2V

Note: the above options are of Zhengtai brand, users can purchase them according to the model.

6-3-5. Brake resistor selection

When the inverter is slow down with large inertia load or needs to slow down rapidly, the motor will be in power generation state. The load energy will be transmitted to the DC link of the converter through the inverter bridge, which causes the voltage rise of the converter bus. When the value exceeds a certain value, the inverter will report an over-voltage alarm. In order to prevent this phenomenon, the brake components must be configured.

1. The design, installation, commissioning and operation of the equipment must be carried out by trained and qualified professionals.
2. In the process of work, all the provisions in the "warning" must be observed, otherwise serious personal injury or heavy property loss may be caused.
3. Non professional construction personnel are not allowed to conduct wiring, otherwise the circuit of inverter or brake options will be damaged.
4. Before connecting the brake resistor to the inverter, please read the instruction manual of the brake resistor / brake unit carefully.
5. Do not connect the brake resistor to terminals other than PB and P +, and do not connect the brake unit to terminals other than P+ and P-. Otherwise, the brake circuit and inverter may be damaged and fire may be caused.

As shown in the wiring diagram, please connect the inverter with the braking resistance. If the wiring is wrong, the inverter or other equipment may be damaged.

Brake resistor selection

When braking, the regenerative energy of the motor is almost all consumed on the braking resistance. According to the formula:

$$U \times U / R = Pb$$

U --- Braking voltage of system stable braking (different system U values are different, the default braking voltage of VH5 series inverter is 690V, which can be adjusted through P7-59),

Pb ---Braking power.

Brake resistor power selection

Theoretically, the power of the braking resistor is the same as that of the braking power, but considering that the derating is A. According to the formula:

$$A \times Pr = Pb \times D$$

A --- Generally, the value is about 50%,

Pr --- Resistor power,

D --- Braking frequency, that is, the proportion of regeneration process in the whole working process

Note: value A is the derating coefficient of the braking resistance. A lower value A can ensure that the braking resistance will not overheat. Users can appropriately increase value A when the braking is good, but it is better not to exceed 50%, otherwise there will be the risk of fire caused by overheated resistance.

Typical braking frequency value

Common applications	Elevator	Unwinding and winding	Centrifuge	Accidental braking load	General occasions
Braking frequency value	20% ~30%	20 ~30%	50%~60%	5%	10%

Brake resistor models

VFD model	Brake unit	Recommended brake resistor specifications		
		Brake resistor (Ω)	Brake resistor power (W)	Brake resistor quantity
VH5-40.7G/1.5P-B	Built-in	≥300	≥150	1
VH5-41.5G/2.2P-B	Built-in	≥220	≥150	1
VH5-42.2G/3.7P-B	Built-in	≥200	≥250	1
VH5-43.7G/5.5P-B	Built-in	≥130	≥300	1
VH5-45.5G/7.5P-B	Built-in	≥90	≥500	1
VH5-20P7-B	Built-in	≥150	≥200	1
VH5-21P5-B	Built-in	≥100	≥320	1
VH5-22P2-B	Built-in	≥60	≥530	1

Note:

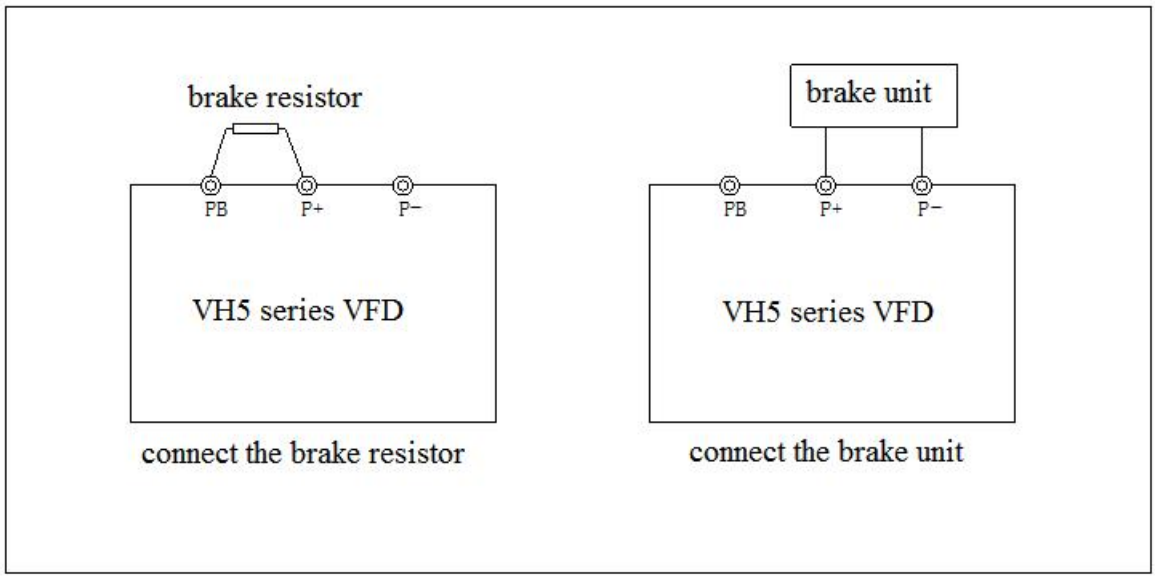
(1) The value in the table is for reference. Users can choose different resistance values and power according to the actual situation (but the resistance value must not be less than the recommended value in the table, and the power can be larger). The selection of braking resistance needs to be determined according to the power generated by the motor in the practical application system, which is related to the system inertia, deceleration time, energy of potential energy load, etc, Customers need to choose according to the actual situation. The greater the inertia of the system, the shorter the deceleration time and the more frequent the braking, the greater the power and the smaller the resistance value of the braking resistor.

(2) The brake resistance cable shall be shielded cable.

(3) All resistors must be installed in a well ventilated place.

(4) It is suggested that the material of brake resistor accessories should be flame retardant, and the surface temperature of the resistor is very high. Even the temperature of the air flowing out of the resistance can be as high as several hundred degrees, so the material must be prevented from contacting with the resistance.

(5) The brake resistor must be connected to the PB and P + terminals, and the brake unit must be connected to the P+ and P- terminals. As shown in the figure below:



7. Fault and solution

7-1. Fault alarm and solution

When the inverter is abnormal, the LED tube will display the function code and its content of the corresponding fault, the fault relay will act, and the inverter will stop output. In case of fault, if the motor is rotating, it will stop freely until it stops rotating. The possible fault types of inverter are shown in the table. When the inverter fails, the user should first check according to the table, and record the failure phenomenon in detail. If you need technical service, please contact our after-sales service and technical support department or our agents.

Code	Name	Reason	Solution
Err01	Acceleration over current	1. There is grounding or short circuit in the output circuit of inverter 2. The control mode is vector control without parameter tuning 3. The acceleration time is too short 4. Improper manual torque lifting or VF curve 5. The voltage is low 6. Start the rotating motor 7. Sudden loading during acceleration 8. The selection of inverter is too small	1. Remove peripheral faults 2. Tuning of motor parameters 3. Increase acceleration time 4. Adjust the manual lifting torque or VF curve 5. Adjust the voltage to the normal range 6. Select speed tracking start or wait until the motor stops 7. Cancel sudden loading 8. Choose the inverter with higher power level
Err02	Deceleration over current	1. There is grounding or short circuit in the output circuit of inverter 2. The control mode is vector control without parameter tuning 3. The deceleration time is too short 4. The voltage is low 5. Sudden loading during deceleration 6. There is no additional brake unit and brake resistor	1. Remove peripheral faults 2. Tuning of motor parameters 3. Increase deceleration time 4. Adjust the voltage to the normal range 5. Cancel sudden loading 6. Add brake unit and resistor
Err03	Constant speed over current	1. There is grounding or short circuit in the output circuit of inverter 2. The control mode is vector control without self learning 3. The voltage is low 4. Is there sudden load in operation 5. The selection of inverter is too small	1. Remove peripheral faults 2. Tuning of motor parameters 3. Adjust the voltage to the normal range 4. Cancel sudden loading 5. Choose the inverter with higher power level
Err04	Acceleration overvoltage	1. High input voltage 2. There is external force to drive the motor during acceleration 3. Acceleration time too short 4. There is no additional brake unit and brake resistor	1. Adjust the voltage to the normal range 2. Cancel additional force or add brake resistor 3. Increase acceleration time 4. Add brake unit and resistor
Err05	Deceleration overvoltage	1. High input voltage 2. There is external force to drive the motor during deceleration 3. The deceleration time is too short 4. There is no additional brake unit and	1. Adjust the voltage to the normal range 2. Cancel additional force or add brake resistor 3. Increase deceleration time

Code	Name	Reason	Solution
		brake resistor	4. Add brake unit and resistor
Err06	Constant speed over voltage	1. High input voltage 2. In the process of operation, there is external force to drive the motor	1. Adjust the voltage to the normal range 2. Cancel additional force or add brake resistor
Err07	Buffer resistance overload fault	1. Unstable supply voltage 2. The main control board is abnormal	1. Adjust the voltage to the normal range 2. Contact us
Err08	Under voltage	1. Instantaneous power failure 2. The input voltage of inverter is not in the range of specification requirements 3. Abnormal bus voltage 4.Abnormal rectifier bridge and buffer resistance 5. Abnormal drive board 6. Abnormal control board	1. Reset fault 2. Adjust the voltage to the normal range 3. Contact us
Err09	VFD overload	1. Whether the load is too large or the motor stalls 2. The selection of inverter is too small	1. Reduce the load and check the motor and mechanical condition 2. Choose the inverter with higher power level
Err10	Motor overload	1. Is the setting of motor protection parameters appropriate 2. Whether the load is too large or the motor stalls 3. The selection of inverter is too small	1. Set this parameter correctly 2. Reduce the load and check the motor and mechanical condition 3. Choose the inverter with higher power level
Err11	Input lack phase	1. Abnormal three-phase input power supply 2. Abnormal drive board 3. Abnormal lightning protection board 4. The main control board is abnormal	1. Check and eliminate problems in peripheral circuit 2. Contact us
Err12	Output lack phase	1. The lead from inverter to motor is abnormal 2. The three-phase output of inverter is unbalanced when the motor is running 3. Abnormal drive board 4. Module is abnormal	1. Remove peripheral faults 2. Check whether the three-phase winding of the motor is normal and remove the fault 3. Contact us
Err13	Overheated radiator / module	1. The ambient temperature is too high 2. Air duct blocked 3. The fan is damaged 4. Module thermistor damaged 5. Inverter module damaged	1. Reduce the ambient temperature 2. Clean the air duct 3. Replace the fan 4. Replace the thermistor 5. Replace inverter module
Err14	Contactor fault	1. Abnormal drive board and power supply 2. The contactor is abnormal	1. Replace the drive board or power board 2. Replace the contactor
Err15	Current detection fault	1. Check the Hall device 2. Abnormal drive board	1. Replace Hall element 2. Replace the drive plate
Err16	Motor tuning fault	1. The motor parameters are not set according to the nameplate 2. Parameter tuning process timeout	1. Set the motor parameters correctly according to the name plate 2. Check the lead from inverter to motor
Err18	Short circuit fault	Motor short circuit to ground	Replace motor or cable

Code	Name	Reason	Solution
	of motor to ground		
Err19	Load drop	VFD operation current is lower than P7-61	Confirm whether the load is separated or whether the P7-61 and P7-62 parameter settings conform to the actual operating conditions
Err20	Wave by wave current limiting fault	1. Whether the load is too large or the motor stalls 2. The selection of inverter is too small	1. Reduce the load and check the motor and mechanical condition 2. Choose the inverter with higher power level
Err21	Pole position detection failed	The deviation between the motor parameters and the actual value is too large	Re-determine the motor parameters, focusing on whether the motor rated current is too small
Err23	Brake resistance short circuit	Output current too high	1. Increase acceleration and deceleration time 2. Reduce the load
Err26	SVC stall fault	1. Excessive load 2. Torque limit too small (P6-11)	1. Reduce the load 2. Increase torque limit
Err43	External fault	1. Input the signal of external fault through multi-function terminal X 2. Input external fault signal through virtual Y function	Reset and run again
Err44	Communication (timeout) fault	1. The upper computer is not working properly 2. The communication cable is abnormal 3. Incorrect setting of communication parameter group PC	1. Check the upper computer wiring 2. Check the communication cable 3. Setting communication parameters correctly
Err45	EEPROM read write error	EEPROM chip damaged	Replace the main circuit board
Err46	Operation time arrival	The accumulated running time reaches the set value	Use the parameter initialization function to clear the record information
Err47	Power on time arrival	The accumulated power on time reaches the set value	Use the parameter initialization function to clear the record information
Err48	User defined fault 1	1. Input user-defined fault 1 signal through multi-function terminal X 2. Input user defined fault 1 signal through virtual IO function	Reset and run again
Err49	User defined fault 2	1. Input user-defined fault 2 signal through multi-function terminal X 2. Input user defined fault 2 signal through virtual IO function	Reset and run again
Err50	PID feedback lost in operation	PID feedback is less than P7-27 setting value	Check PID feedback signal or set P7-27 to an appropriate value
Err51	Switch motor in operation	In the process of inverter operation, change the current motor selection through the terminal	Switch the motor after the inverter stops
Err52	Speed offset too large	1. Encoder parameter setting incorrect 2. Motor blocked 3. Incorrect UVW wiring	1. Setting encoder parameters correctly 2. Check whether the machine is abnormal 3. Check whether the wiring between

Code	Name	Reason	Solution
			inverter and motor is abnormal
Err53	Motor overspeed fault	1. Incorrect setting of encoding parameters 2. The motor is not tuned 3. Unreasonable setting of motor over speed detection parameters P7-63 and P7-64	1. Setting encoder parameters correctly 2. Tuning correctly 3. Set reasonable parameters according to the actual situation
Err54	Motor overheat fault	1. Loose wiring of temperature sensor 2. Motor temperature too high	1. Check the wiring of temperature sensor 2. Reduce the carrier wave or take other measures to dissipate the motor heat.
Err56	Power on lock time reached	Power on time arrival	When the usage time arrives, please enter the password in A4-00.

7-2. Fault record query

This series of inverter records the fault codes and operation parameters of the inverter for the last three times. Querying these information is helpful to find out the cause of the fault. All fault information is saved in P7 group parameters. Please refer to the keyboard operation method to enter P7 group parameters to check the information.

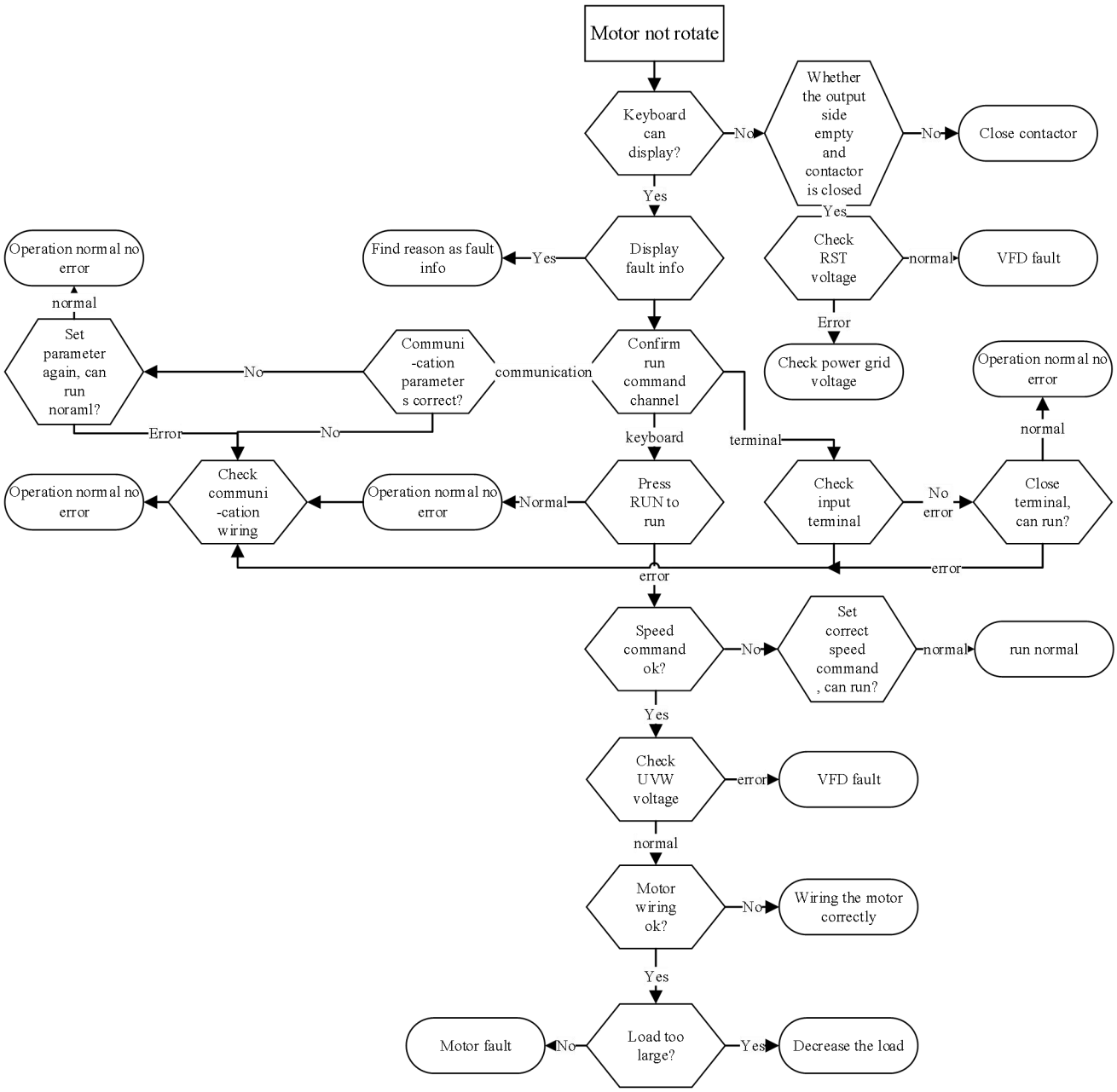
7-3. Fault reset

In case of a failure of the inverter, to resume normal operation, you can select any of the following operations:
(1) When the fault code is displayed, press stop after confirming that it can be reset.
(2) Set any terminal of X1-X4 to reset stop input for external fault, and then disconnect from com terminal after closing.
(3) Cut off the power supply.

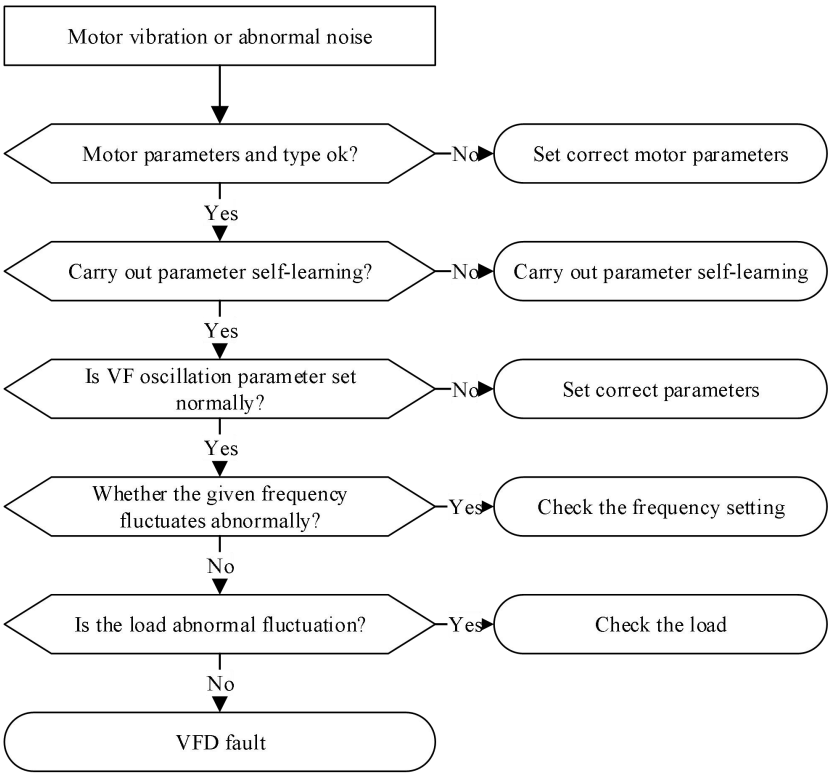
Note:
(1) Before reset, the reason of the fault must be thoroughly identified and eliminated, otherwise, the permanent damage of the inverter may be caused.
(2) If the fault cannot be reset, check the reason, and the continuous reset will damage the inverter.
(3) When overload and overheating protection acts, it shall be reset 5 minutes later.

7-4. VFD common fault analysis

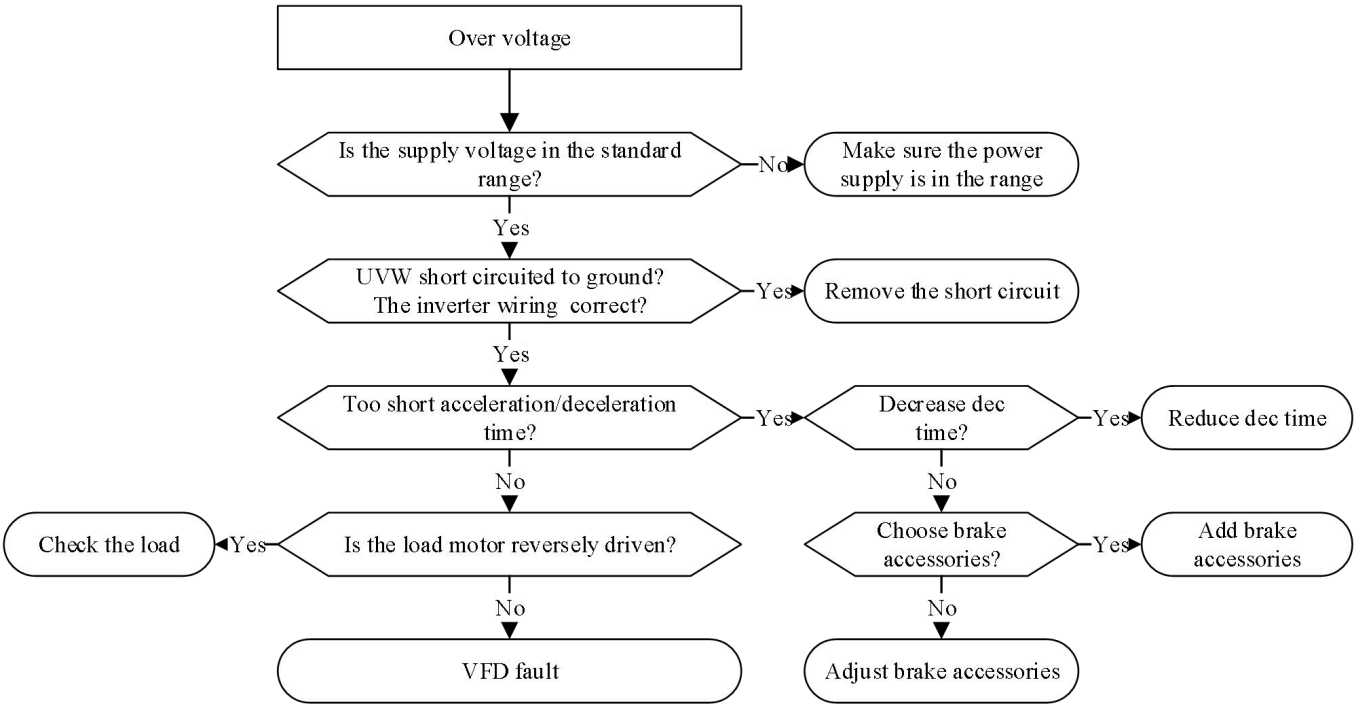
7-4-1. Motor not rotate



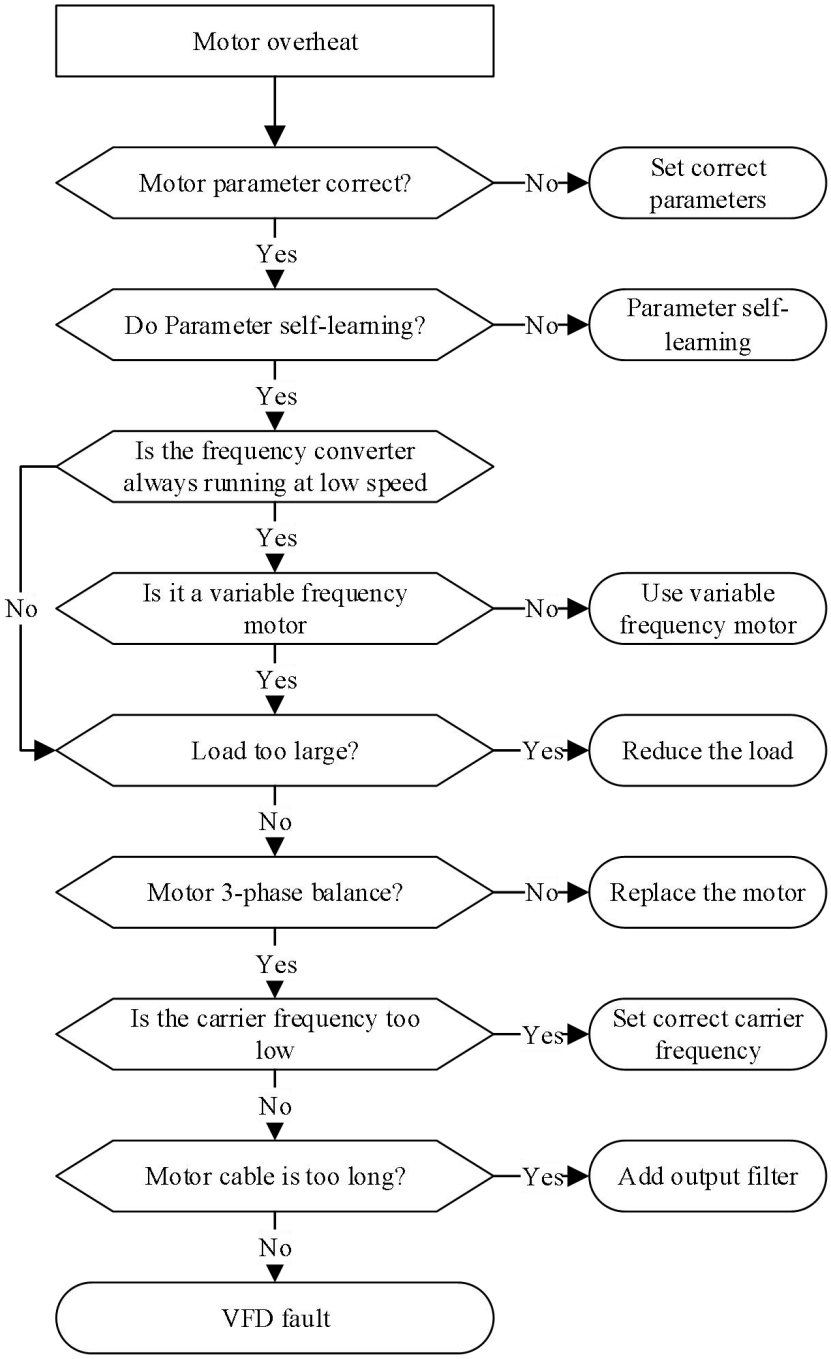
7-4-2. Motor vibration



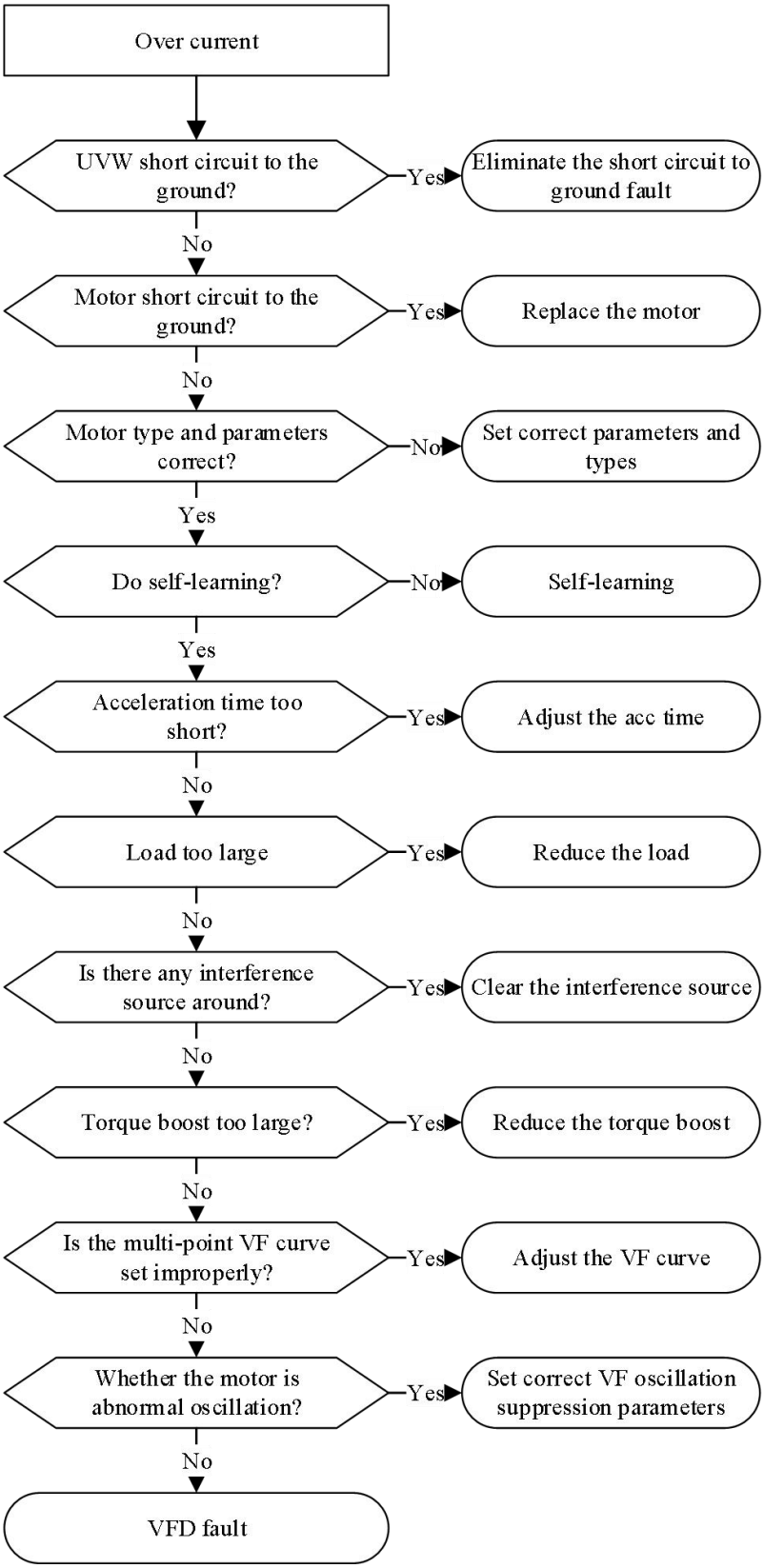
7-4-3. Over voltage



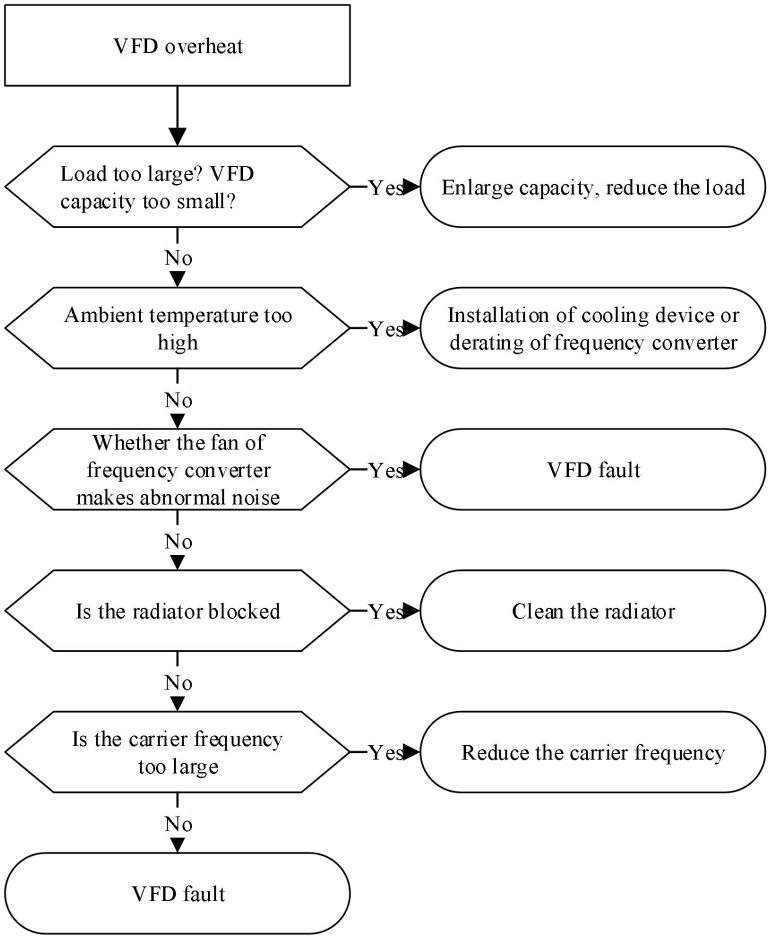
7-4-4. Motor overheat



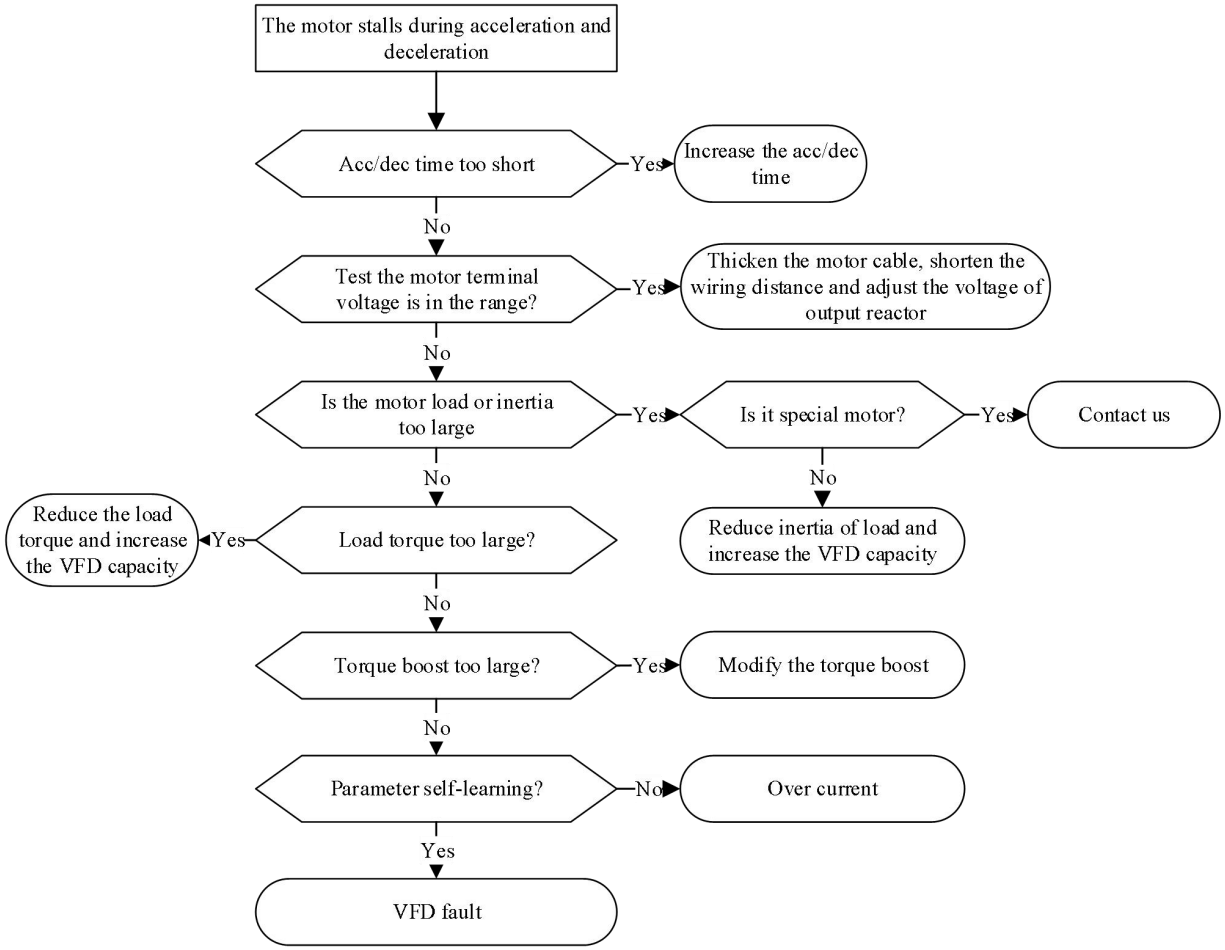
7-4-5. Over current



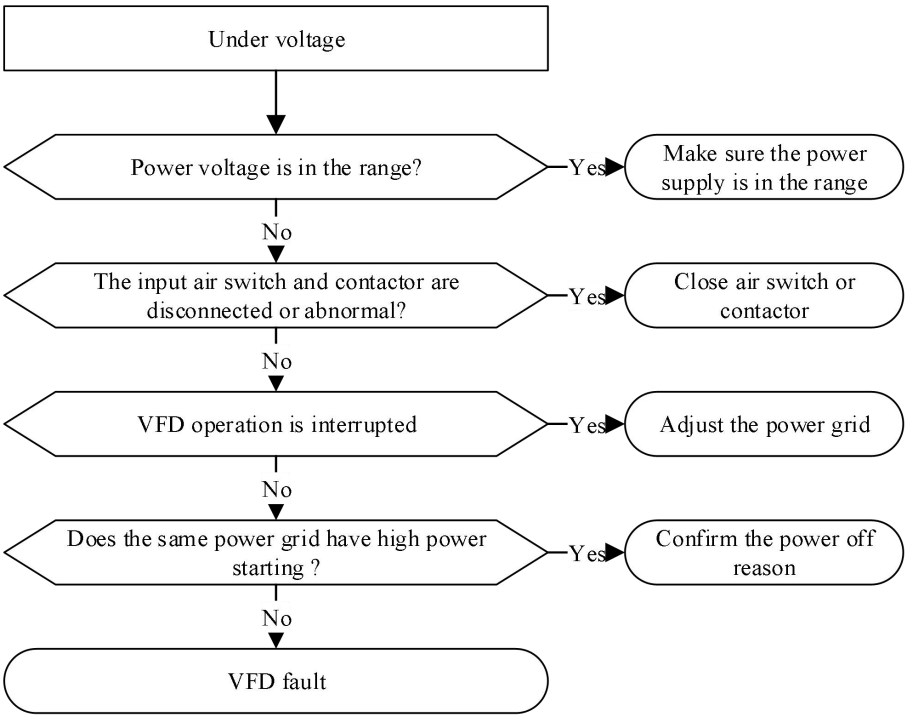
7-4-6. VFD overheat



7-4-7. The motor stalls during acceleration and deceleration



7-4-8. Under voltage



8. Maintenance

The change of the operating environment of the inverter, such as the influence of temperature, humidity, smoke, etc., and aging of the internal components of the converter, may lead to various faults of the inverter. Therefore, the inverter must be checked daily during storage and use, and regular maintenance should be carried out.

8-1. Routine maintenance

When the inverter is turned on normally, please confirm the following items:

(1) Whether the motor has abnormal sound and vibration.

(2) Whether the inverter and motor have abnormal heating.

(3) Whether the ambient temperature is too high.

(4) Whether the load ammeter is the same as usual.

(5) Check whether the cooling fan of inverter operates normally.

8-2. Regular maintenance

When the inverter is regularly maintained and inspected, it is necessary to cut off the power supply, and the inspection can only be carried out after the monitor is not displayed and the power indicator of the main circuit is off. The inspection contents are shown in the table below.

Item	Contents	Solution
Screw of main circuit terminal and control circuit terminal	Is the screw loose	Tighten with a screwdriver
Heat sink	Is there any dust	Blow off with 4 ~ 6kgcm^2 dry compressed air
PCB board	Is there any dust	Blow off with 4 ~ 6kgcm^2 dry compressed air
Cooling fan	Whether there is abnormal sound and vibration, and the accumulated operation time is up to 20000 hours	Replace the fan
Power element	Is there any dust	Blow off with 4 ~ 6kgcm^2 dry compressed air
Aluminum electrolytic capacitor	Discoloration, odor and blistering	Replace the Aluminum electrolytic capacitor

In order to make the inverter work normally for a long time, regular maintenance must be carried out according to the service life of the internal electronic components of the inverter. The service life of electronic components of inverter is different because of its different environment and conditions. As shown in the table below, the maintenance period of inverter is only for users' reference.

Component name	Standard replacement years
Cooling fan	2~3 years
Electrolytic capacitor	4~5 years
PCB board	5~8 years

Fuse	10 years

The service conditions for the replacement time of the above inverter components are as follows:

(1) Ambient temperature: annual average 30℃.

(2) Load factor: below 80%.

(3) Running time: less than 12 hours per day.

8-3. Warranty of inverter

The company will provide warranty service in case of the following conditions:

(1) The warranty scope only refers to the inverter body.

(2) In normal use, if the inverter fails or is damaged within 15 months, the company is responsible for the warranty, reasonable maintenance fee will be charged for more than 15 months.

(3) Within 15 months, a certain maintenance fee shall also be charged in case of the following situations:

- Failure to follow the operation steps in the instruction manual will cause damage to the inverter.
- inverter damage caused by flood, fire, abnormal voltage, etc.
- inverter damage caused by wrong connection cable, etc.
- Damage caused by using inverter for abnormal functions.

(4) The service fee shall be calculated according to the actual cost. If there is a contract, it shall be handled according to the principle of contract priority.

Appendix

Appendix A. Extension card

VH5 series inverter can support fieldbus expansion cards. This chapter describes the installation and use of each expansion card.

VFD model	Extension card	Function	Using model
VH5-CC100	EtherCAT card	Support EtherCAT protocol	VH5 series models
VH5-CN100	CANopen card	Support CANopen protocol	VH5 series models

Appendix A-1. Extension card functions

Appendix A-1-1. VH5-CC100 EtherCAT card

(1) Overview

EtherCAT is an open architecture fieldbus system based on Ethernet. It sets a new standard for the real-time performance and topology flexibility of the system. At the same time, it also meets or even reduces the use cost of fieldbus. VH5-CC100 is an extended card specially designed for EtherCAT protocol by XINJE company, which is specially suitable for XINJE inverter, Through this card, the XINJE inverter can be connected to the international standard EtherCAT network and exist as a slave station.

(2) Pin definition

VH5-CC100 card has two Ethernet port, the pin definition is shown as the following:

Terminal no.	Name	Function
1	TX A+	Data send +
2	TX A-	Data send -
3	RX A+	Data receive +
4	Vacant	-
5	Vacant	-
6	RX A-	Data receive -
7	Vacant	-
8	Vacant	-

Note: For more details, please refer to VFD EtherCAT expansion card manual.

Appendix A-1-2. VH5-CN100 Canopen card

(1) Overview

CANopen complies with CANopen application layer protocol of CAN Fieldbus international standard. VH5-CN100 is an extended card specially designed for CANopen protocol by XINJE company, which is specially suitable for VH5. Through this card, VH5 series inverter can be connected to CANopen network and exist as a slave station.

(2) Pin definition

VH5-CN100 card has two Ethernet port, the pin definition is shown as the following:

Terminal no.	Name	Function
1	CAN_H	Connect to CAN+
2	CAN_L	Connect to CAN-
3	CGND	Connect to CAN ground
4~10	Vacant	Vacant

Note: For more details, please refer to VFD CANopen expansion card manual.

Appendix B. Communication protocol

Appendix B-1. Communication protocol overview

VH5 series inverter provides the general RS485 communication interface in industrial control to users. The communication protocol adopts MODBUS standard communication protocol. The converter can be used as slave and communicate with the upper computer with the same communication interface and the same communication protocol (such as PLC controller and PC) to realize centralized monitoring of the inverter. In addition, the user can also use a inverter as the master, and connect several inverters of our company as slave through RS485, in order to realize the multi-machine linkage of the inverter. The remote control keyboard can also be connected through the communication port to realize the remote operation of the inverter by users.
The Modbus communication protocol of this converter supports RTU mode. The following is a detailed description of the communication protocol of the inverter.

Appendix B-2. Communication protocol explanation

Appendix B-2-1. Communication protocol mode

The inverter can be used as the master or slave in RS485 network. When used as the master, it can control other inverters of our company to realize multi-level linkage. When it is used as slave, PC or PLC can be used as the master to control the inverter. The specific communication mode is as follows:
(1) The inverter is slave, and the master-slave point-to-point communication is adopted. When the master uses the broadcast address to send commands, the slave does not respond.
(2) As the master, the inverter sends commands to the slave using broadcast address, and the slave does not respond.
(3) Users can set the local address, baud rate and data format of the converter by keyboard or serial communication.
(4) The slave reports the current fault information in the last reply frame to the master.

Appendix B-2-2. Communication port

The communication is RS485 interface, asynchronous serial, half duplex transmission. The default data format is: 1 start bit, 8 data bits and 1 stop bit.
The default baud rate is 19200bps. Please refer to P9 group parameters for communication parameter settings.

Appendix B-3. Modbus-RTU protocol

Appendix B-3-1. Character structure

(1－8－2, no parity)

Start bit	0	1	2	3	4	5	6	7	Stop bit	Stop bit

(1－8－1, odd parity)

Start bit	0	1	2	3	4	5	6	7	Odd parity	Stop bit

(1－8－1, even parity)

Start bit	0	1	2	3	4	5	6	7	Even parity	Stop bit

(1－8－1, no parity)

Start bit	0	1	2	3	4	5	6	7	Stop bit

Appendix B-3-2. Communication data structure

RTU mode

START	Keep no input signal at least 10ms
Address	Communication address: 8-bit binary address
Function	Function code: 8-bit binary address
DATA（n-1）	Data content: N*8-bit data, N<=8, max 8 bytes
……	
DATA 0	
CRC CHK Low	CRC parity
CRC CHK High	16-bit CRC parity code is composed of two 8-bit binary
END	Keep no IO signal at least 10ms

Communication address

00H: all inverter broadcast

01H: communicate with 01 address inverter.

0FH: communication with 15 address inverter.

10H: communication with 16 address inverter. And so on... , up to 254 (FEH).

Function code and data

Function code	Explanation
03H	Read the contents of registers, read multiple registers, but not more than 12 at a time, each time can only read the same group of data
06H	Write data into the register
08H	Loop detection

(1) Function code 03H: read register

For example, read the register address 7000H (operation frequency).

RTU mode

Format of inquiry information		Format of response information	
Address	01H	Address	01H
Function code	03H	Function code	03H
Register address	70H	Byte number	02H
	00H		
Register quantity	00H	Data contents	00H
	01H		00H
CRC CHECK Low	9EH	CRC CHECK Low	B8H
CRC CHECK High	CAH	CRC CHECK High	44H

(2) Function code 06H: write into the register

For example, write 50.00Hz in the inverter address 1000H.(Based on P0-13=50.00Hz)

RTU mode:

Format of inquiry information		Format of response information	
Address	01H	Address	01H
Function code	06H	Function code	06H
Register address	10H	Register address	10H
	00H		00H
Data contents	27H	Data contents	27H
	10H		10H
CRC CHECK Low	97H	CRC CHECK Low	97H
CRC CHECK High	36H	CRC CHECK High	36H

(3) Function code 10H: write multi-group data to the register(supported by 3730 and above versions)

For example, write 1 to H0001(P0-01) and write 2 to H0002(P0-02) .

RTU mode:

Format of inquiry information		Format of response information	
Address	01H	Address	01H
Function code	10H	Function code	10H
Register code	00H	Register address	00H
	01H		01H
Register quantity	00H	Register quantity	00H
	02H		02H
Byte quantity	04H(2*Register quantity)	CRC CHECK Low	10H
Data 1 content high	00H	CRC CHECK High	08H
Data 1 content low	01H		
Data 2 content high	00H		
Data 2 content low	02H		
CRC CHECK Low	E2H		
CRC CHECK High	62H		

(4) Command code: 08H communication loop test (Not supported)

This command is used to test whether the communication between the master control equipment and the inverter is normal. The inverter will return the received data to the main control equipment.

RTU mode

Format of inquiry information		Format of response information	
Address	01H	Address	01H
Function code	08H	Function code	08H
Contents	01H	Contents	01H
	02H		02H
	03H		03H
	04H		04H
CRC CHECK Low	41H	CRC CHECK Low	41H
CRC CHECK High	04H	CRC CHECK High	04H

Parity code

RTU mode: Double byte hexadecimal number.

The CRC domain is two bytes, containing 16-bit binary values. It is added to the message after calculation by the sender. The high byte of CRC is the last byte of the sending message. The receiving device recalculates the CRC of the received message and compares it with the value in the received CRC domain. If the two values are different, the received message has an error, discards the message frame, and does not respond to it. The next frame data will be received.

Appendix B-3-3. Communication protocol parameter address

(1) The communication address of the function code parameter is shown in the table below. The high position is the group number and the low position is the parameter serial number.

Parameter group	Power off memory address	Power off no memory address
P0~PF	0x0000~0x0FFF	0x3000~0x3FFF
A0~AF	0xA000~0xAFFF	0x4000~0x4FFF
U0	0x7000~0x70xx	

- When reading function code data through the communication

For group P and group A function code data, the upper 16 bits of the communication address are the group number, and the lower 16 bits are the serial number of the function code in the function group.

For example, P0-16 function parameter, communication address is 0x0010, 00 represents the function parameter of group P0, and 10 represents the hexadecimal data format of function code 16 in function group.

A0-15 function parameter, communication address is 0xA00F, A0 represents A0 group function parameter, 0F represents hexadecimal data format of function code in function group serial number 15.

- When writing function code data through the communication

For group P function code data, the upper 16 bits of its communication address are divided into 0x0000 ~ 0x0FFF or 0x3000 ~ 0x3FFF according to whether it is written into EPPROM. The lower 16 bits are directly the serial number of the function code in the function group, for example:

Write function parameters P0-16:

When it is not necessary to be written in EPPROM, its communication address is 0x3010.

When it is necessary to be written in EPPROM, its communication address is 0x0010.

For group A function code data, its communication address high 16 bits can be divided into 0xA000 ~ 0x0FFF or 0x4000 ~ 0x4FFF according to whether it is written into EPPROM. The lower 16 bits are the serial number

of the function code in the function group, for example:

Write function parameter A0-15:

When it is not necessary to be written in EPPROM, its communication address is 0x400F.

When it is necessary to be written in EPPROM, its communication address is 0xA00F.

(2) Non function code

Definition	Modbus address	Function	Note
Communication setting	1000H	Communication frequency	Write
Control command	1100H	1: Forward running 2: Reverse operation 3: Forward jog 4: Reverse jog 5: Deceleration stop 6: Free stop 7: Fault reset	Write
Digital output terminal control	1101H	bit0: Y1 output control bit1: Y2 output control bit2: reserved bit3: RELAY1 output control bit4: RELAY2 output control	Write
Analog output AO	1103H	0~7FFF represents 0%~100%	Write
Torque setting(3730 and above versions)	1105H	0~1000 represents 0.0%~100.0%	Write
Operation status	1200H	1: Forward run 2: Reverse run 3: Stop	Read
VFD fault	1210H	0000H: None 0001H: acceleration over current 0002H: deceleration over current 0003H: constant speed over current 0004H: acceleration overvoltage 0005H: deceleration overvoltage 0006H: constant speed over voltage 0007H: buffer resistance overload fault 0008H: under voltage fault 0009H: inverter overload 000AH: motor overload 000BH: input phase missing 000CH: output phase missing 000DH: radiator overheating 000EH: contactor fault 000FH: current detection fault 0010H: motor tuning fault 0011H: code disk failure 0012H: motor short circuit to ground	Read

Definition	Modbus address	Function	Note
		fault 0014H: wave by wave current limiting fault 0015H: pole position detection failed 0016H: UVW signal feedback error 0017H: brake resistance short circuit 001AH: SVC stall fault 002BH: external fault 002CH: Communication (timeout) failure 002DH: EEPORM read / write failure 002EH: run time arrived 002FH: power on time arrived 0030H: user defined fault 1 0031H: user defined fault 2 0032H: PID feedback lost during operation 0033H: switch motor during operation 0034H: large speed deviation 0035H: Motor overspeed 0036H: Motor overtemperature	

When the frequency is set by communication (P0-03=6),

$$Frequency\ (\text{Hz}) = \frac{Data \times \text{P0-13}}{10000}, \quad \text{(Data range:0~10000)}$$

Data can be register or value, user can calculate the Data value according to the above formula when the frequency is set by communication.

For example, if the maximum output frequency of P0-13 is set to 50Hz, write 10000 to the corresponding address H1000 of the frequency, and the actual panel displays the frequency value of 100.00*50%=50Hz.

If there is a user password: after writing the correct password, read it within 30s, otherwise it will need to be written again.

WUXI XINJE ELECTRIC CO., LTD.
No.816, Jianzhu West Road, Binhu District, Wuxi City, Jiangsu Province, China 214072
Tel: 400-885-0136 Fax: (510) 85111290
E-mail: sales@xinje.com
www.xinje.com